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# MONTHLY WEATHER REVIEW

## OCTOBER 1941

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## CORRECTIONS

MONTHLY WEATHER REVIEW, September 1941, vol. 69: Page 262, in the title of the article, "Recalibration of instrumental equipment, etc.," the word "radio" should be "radiation"; page 264, table 2, 15th entry (Twin Falls, Idaho), 2d column, "U. S. Bureau of Plant Industry" should read, "U. S. Bureau of Entomology and Plant Quarantine."

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JAN 17 '42

# MONTHLY WEATHER REVIEW

Editor, EDGAR W. WOOLARD

VOL. 69, No. 10
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OCTOBER 1941

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## A STUDY OF EXCESSIVE RAINFALL

By H. D. DYCK and W. A. MATTICE

[Weather Bureau, Washington, D. C., April 1941]

The Weather Bureau, for statistical purposes, classifies excessive rainfall into four groups: Two of these are for short-period storms and give the minimum rate of fall, in terms of minutes, for a group of southern States as distinguished from the remainder of the country. The other two classes are established at 1.00 inch in one hour and 2.50 inches in 24 hours. The subject of excessive rains for short periods of time has been covered adequately by Yarnell;[1] we here take up the rates for longer periods of time than considered by Yarnell, covering the two time intervals of 1 hour and 24 hours. In a general way, the data are intended to supplement and extend the Yarnell material.

The study is limited in a number of ways. The period of record chosen was 1908–37, inclusive, to give the maximum number of stations possible. This limitation was most evident over the Great Plains and the West where scarcity of observations caused considerable irregularities. In numerous instances the data for these regions had to be ignored. With two exceptions, data were excluded for all stations that did not have a continuous record throughout the period. This restriction limits the study to records from 155 stations for the 30-year period. The data, for first-order stations only, often leave wide gaps between stations, but an attempt has been made to show the comparability between these and cooperative stations.

Many authorities cite as a serious deficiency in Weather Bureau records the fact that at most northern stations the tipping-buckets of the recording gages are removed during the winter months. The deficiency is not serious when precipitation of 2.50 inches or over in 24 hours is considered; undoubtedly the record of heavy rains in late fall or early spring is somewhat deficient, but the lack of these data may not be serious.

Figure 1 indicates a mean frequency distribution of rains of 1.00 inch or more per hour for a group of southerly stations and for a group of northerly stations chosen almost at random. The similarity between the two curves is apparent and if it may be said that the correspondence continues through the winter months, it is clear that the removal of the tipping bucket from the gage during the winter months has not resulted in any serious loss of record.

That an increase in average annual precipitation is attended by an increase in the number of rains of the 2.50/24 hour rate has been accepted in a general way and considered almost axiomatic. Figure 2 shows that this general conclusion is substantially correct, but the relation is somewhat more involved than generally believed. The spread of the dots in the figure illustrates vividly that the relation is general rather than specific and the curve of best fit is an approximation only. In fitting the curve several points were picked on one which had been sketched in free hand. These points were used in fitting the logarithmic curve shown. The conditions prevailing on the north Pacific coast are so localized and peculiar to that region that they do not fit the general tendencies. Accordingly, data for those stations were omitted in this graph.

The applicability of precipitation data to areas of somewhat larger extent than the immediate vicinity of the gage itself has always been problematical. In this study, records for three first-order stations with nearby cooperative records available were examined, the latter covering the same period as the former. A comparison of rains of the 1.00 inch/hour rate was impossible, but a comparison

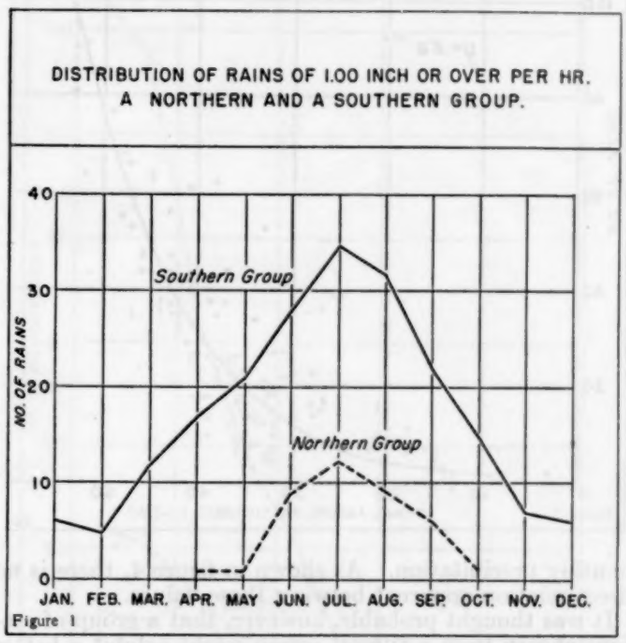


Figure 1

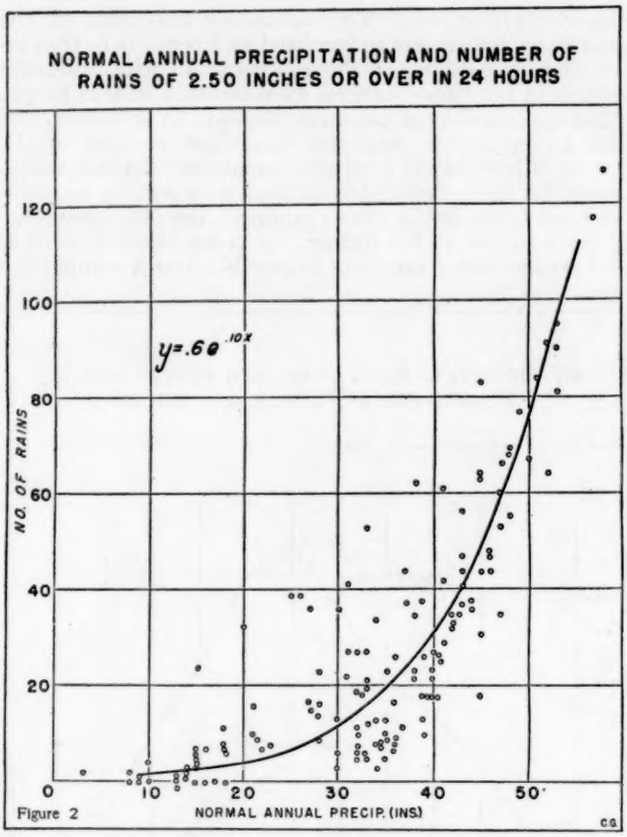
of those at the 2.50 inches/24 hour rate was made. The first-order stations and the nearby cooperative stations were as follows: Mobile-Citronelle, Ala.; Macon-Milledgeville, Ga.; and Nashville-Franklin, Tenn. In Alabama the cooperative station is about 20 miles northwest; in Georgia about 30 miles northeast; and in Tennessee about 18 miles south of the first-order stations, respectively.

The results of these comparisons are shown in figure 3. It may be seen that the same general tendencies are shown at both stations. As the cooperative observations are taken once a day and the rainfall amounts then recorded are for the preceding 24 hours, it may sometimes happen

[1] Yarnell, David L. *Rainfall intensity-frequency data.* U. S. Dept. of Agriculture Misc. Pub. 204. Washington, August, 1935.

that an observation will occur during a period of heavy rain, thus splitting the total amount for a storm. Accordingly, a supplemental tabulation was made of all rainfall amounts on two successive days that would add up to 2.50 inches or more. It is realized that this procedure can hardly be considered as refined, but the additional data were added to the original tabulation and the result tabulated as "adjusted" values. In each case the shape of the curve of the cooperative data was not materially altered, merely raising the whole series a few points.

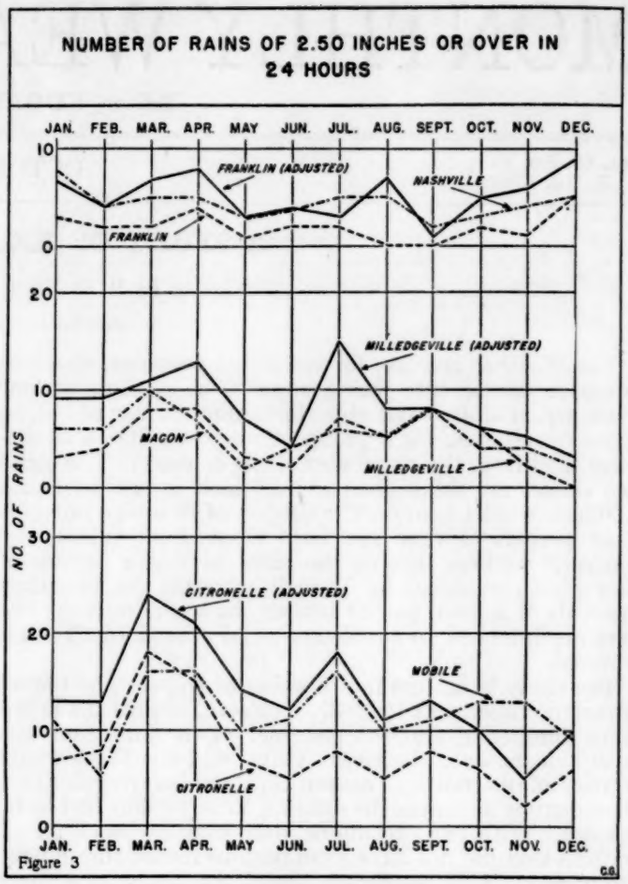
As the relation between precipitation and rains of 2.50 inches/24 hours appeared so acceptable, a comparison was made between rains of this rate and the average

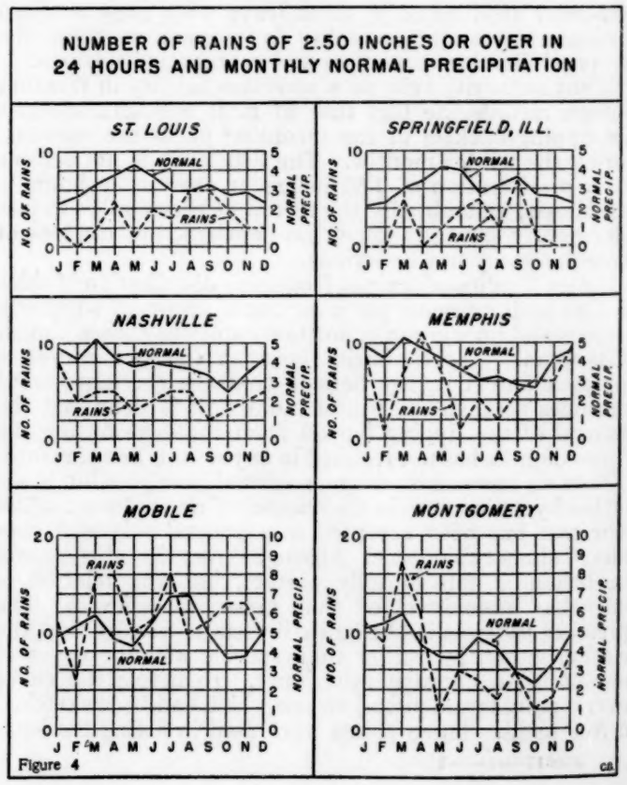



monthly precipitation. As shown in figure 4, there is no direct relation apparent between these values.

It was thought probable, however, that a group of stations chosen from a typical region might exhibit a better relation, and, consequently, six stations were chosen from each of three such regions. The results are shown in figure 5. For the stations in the South, the maximum points of frequency and average monthly rainfall coincide, while for the northeastern stations the maximum and minimum points of frequency display a lag of 1 month with respect to maxima and minima of the normal precipitation curve. There is apparently no direct relation in the Great Plains comparison. Marked, however, is the coincidence of the August frequency in the Great Plains and the northeast section.

The frequency of rains of different rates should exhibit the same general type of so-called "J" curve as other precipitation-frequency data. The rate of rainfall in inches per hour for each occurrence of rains of 1.00 inch or over in one hour was calculated for three widely-sepa-



rated stations. The results, shown in figure 6, are typical of usual precipitation frequencies. As the curves show the same general characteristics, it is believed that they are typical and representative of most stations.

The monthly distribution of rains at the rate of 1.00 inch/hour is illustrated in figure 7. Three southern stations in comparatively close proximity, Mobile, Pensacola, and Montgomery, were chosen, and three central

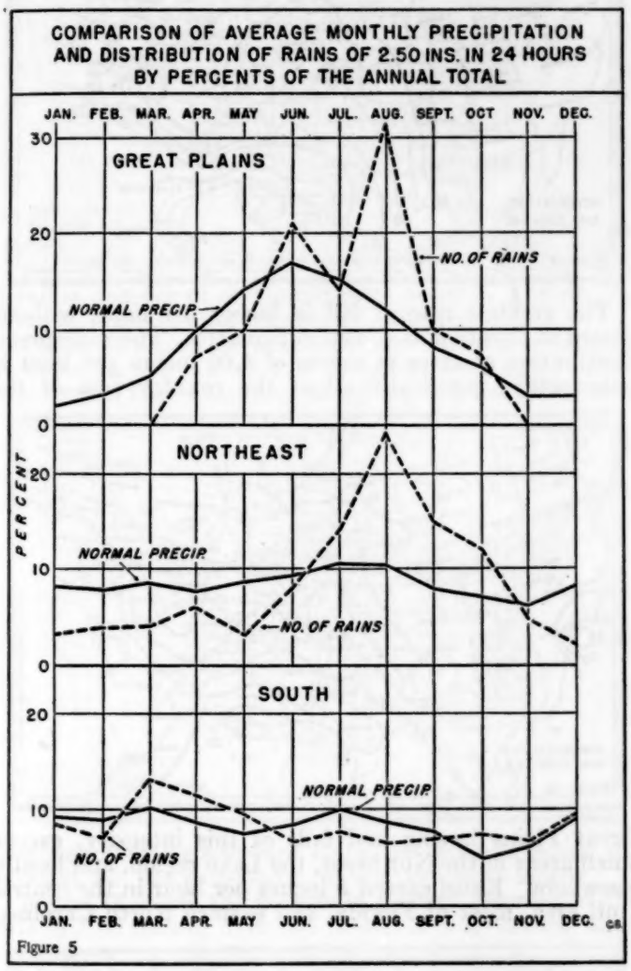


Figure 5

ones, Nashville, Memphis, and St. Louis. At the more northern stations the absence of occurrences in cold months prevents a good monthly comparison.

The southern stations exhibit much the same general characteristics. There is a winter minimum and summer maximum, but there is a secondary maximum in April in each case. Mobile shows a fall maximum in October, and Montgomery in November, but Pensacola declines steadily.

The distribution at the central stations is more erratic. St. Louis shows a maximum in August, Memphis in September, and Nashville a double maximum in June and August. The minimum at Nashville occurs in November, Memphis in January, and St. Louis from November to February.

The frequency of rains at various rates that may be expected, on the average, is an important consideration. Figure 8 shows the number of times that rains of 2.50 inches/24 hours occurred in the 30-year period, 1908–37. Rains of this rate may be expected once, or more, a year along the Middle Atlantic coast and generally south of the lower Ohio Valley and lower Missouri Valley. The immediate Gulf coast from east Texas to Florida and a narrow strip along the South Atlantic coast may expect at least two occurrences a year, while in southern Louisiana and Alabama and northwest Florida, from four to five occurrences are normal.

Figure 9 contains similar data for rains of 1.00 inch/hour. It shows that most of the country east of the Great Plains may expect, on the average, at least one such occurrence a year; that the central Gulf coast may expect at least 8 or 9, and that at least two such rains are likely to occur from eastern Kansas southward, as well as along the Atlantic coast northward to Washington, D. C. Notable in figures 8 and 9 is the effect of elevation in reducing the number of rains at excessive rates, as shown by the diminution over the Ozark and Appalachian regions.

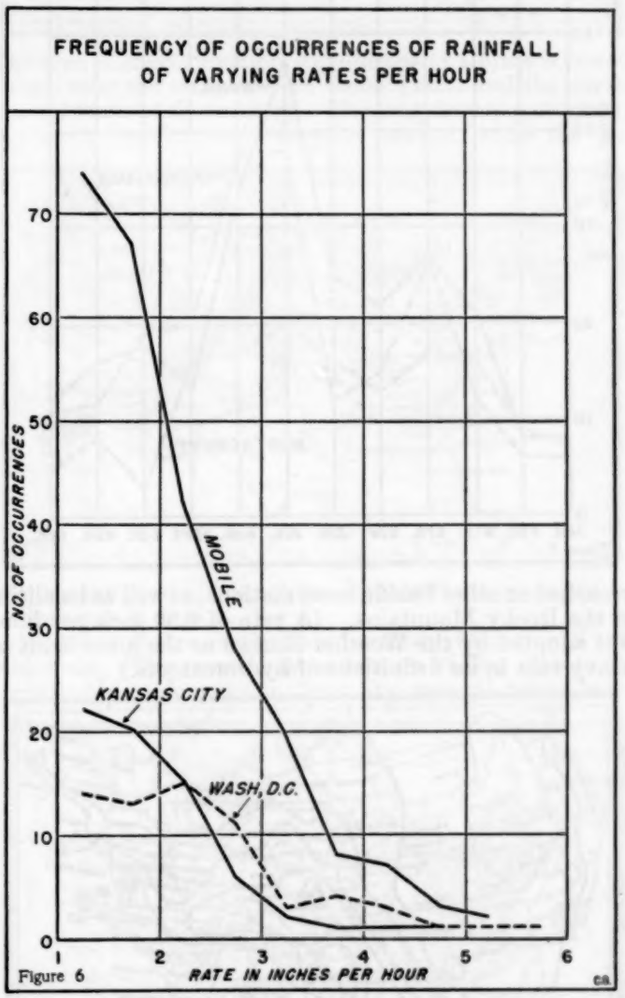
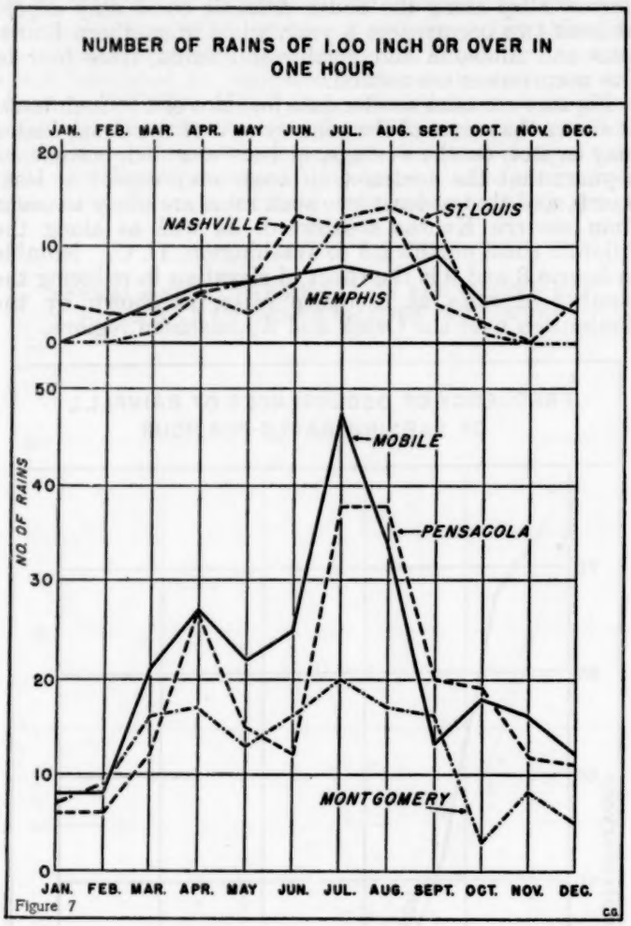


Figure 6

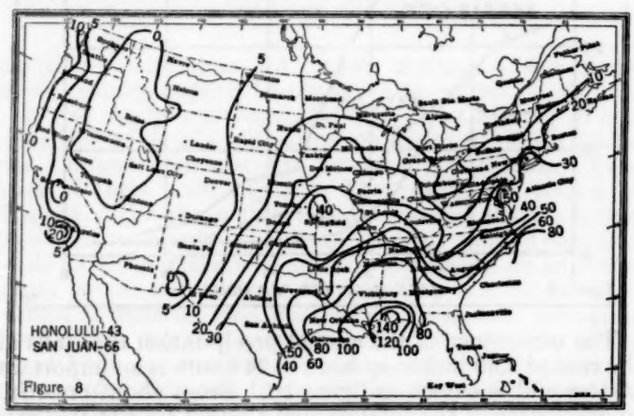
The percentage of the annual precipitation that falls at the rate of 2.50 inches or more in 24 hours is an important matter and is shown in figure 10. From about one-fifth to one-fourth of the total annual amount falls at this rate along the Gulf coast, but there is a decline to only about one-twentieth in northern states.

Figure 11 shows the average rate in inches per hour of all rains at the rate of 2.50 inches or over in 24 hours. The great irregularities in the Northern Plains States are

due to relatively few occurrences and the consequent irregularities of the averages. The minimum rate per hour of this category of rains is about 0.104 inch per hour. This rate is approximated at Roseburg, Oreg., and ap-

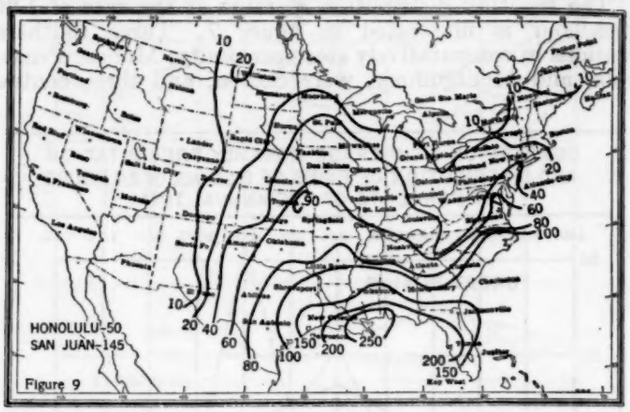



proached at other Pacific coast stations, as well as localities in the Rocky Mountains. (A rate of 0.30 inch per hour was adopted by the Weather Bureau as the lower limit of heavy rain in its definitions of hydrometeors.)

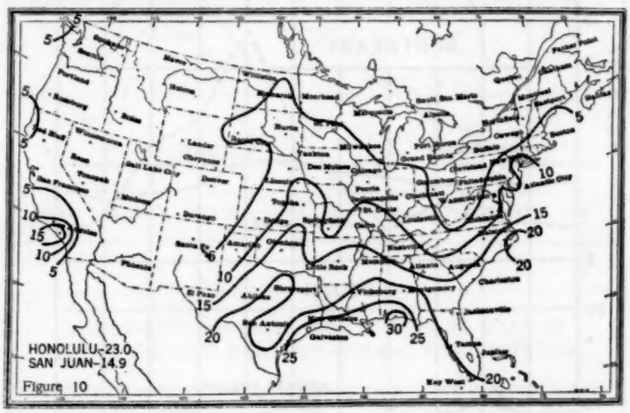



This would seem to indicate that whenever such rains fall they are usually of quite long duration. The area of maximum intensity, exceeding the rate for heavy rain, is noted over the Great Plains, the upper Mississippi Valley, and along the Gulf coast.

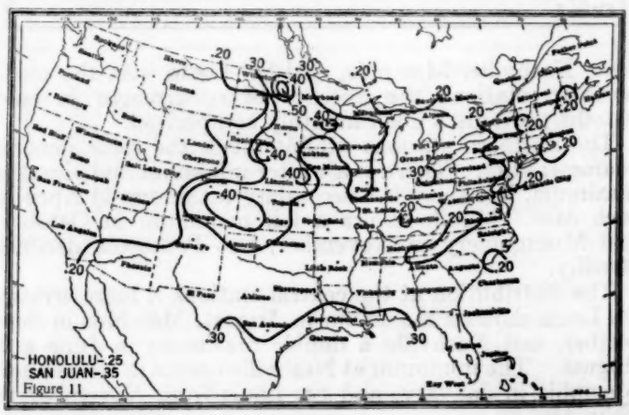
With falls of 1.00 inch/hour, the hourly rate is greater, as shown on figure 12. Here the highest rates again appear in the Great Plains and central Rockies, with rather localized areas elsewhere.




The greatest rate of fall in inches per hour, without regard to duration, is shown in figure 13. The widespread distribution of rates in excess of 4.00 inches per hour is noteworthy, practically all of the country east of the

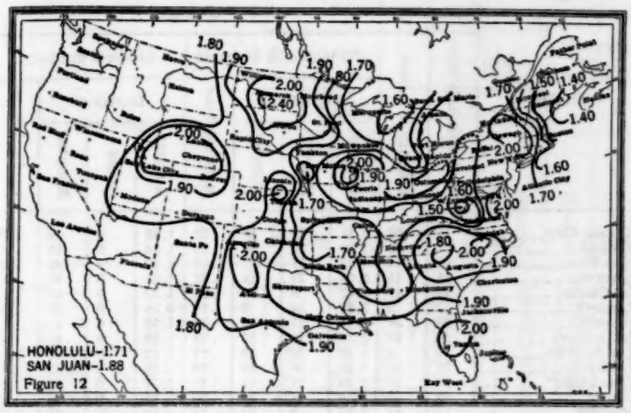



Great Plains having had falls of this intensity, except small areas in the Northeast, the Lake region, and locally elsewhere. Rates exceed 5 inches per hour in the central Gulf area, most of Florida, and eastern North Carolina,



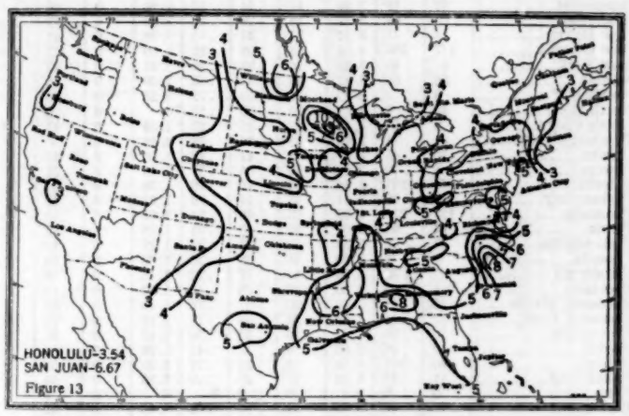

and local areas elsewhere, notably in the vicinity of Washington, D. C., Baltimore, Md., Minneapolis, Minn., and Devils Lake, N. Dak. The rate has exceeded 8 inches per hour at Montgomery, Ala., and Wilmington, N. C.;

while Minneapolis, Minn., shows 10.20 inches per hour, the highest of any of the group of stations used; at Minneapolis 1.02 inches fell in a period of only 6 minutes. The



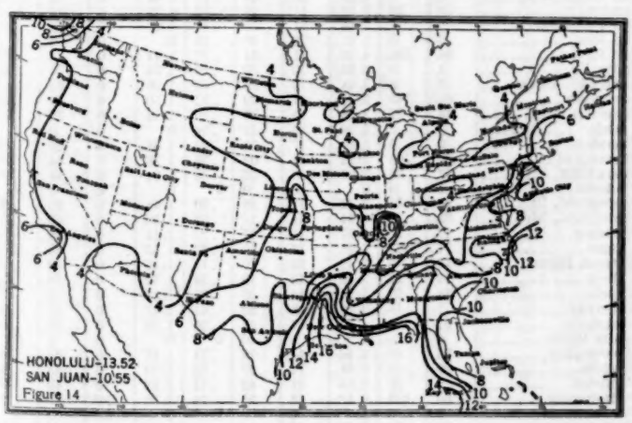

greatest number of maximum rates occur in August, but with an almost equal number in June and July.

Figure 14 shows the maximum amount of precipitation recorded at the rate of 2.50 inches or over in 24 hours. The central Gulf coast has exceeded 16 inches, while from




southern Maine southward along the Atlantic coast, the greatest fall has exceeded 6, 8, and 12 inches locally.

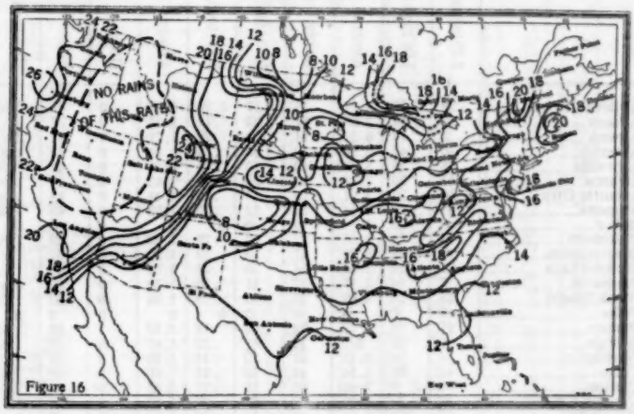
Figure 15 shows the maximum amount recorded at the rate of 1.00 inch or over in 1 hour. A large central area,




as well as the central and south Atlantic coast section, have had rains of over 4 inches at this rate; the greatest fall was 14.45 inches in 9 hours 35 minutes at Pensacola, Fla.

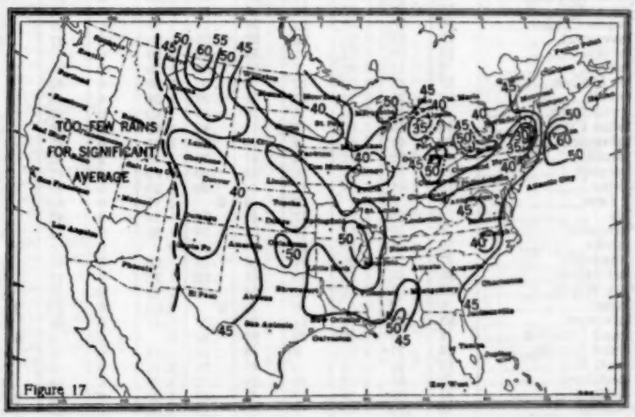
The duration of rain at the different rates is just as important as the depth of fall. Figure 16 shows the average duration of rains at the rate of 2.50 inches/24 hours.

The area of short-duration, high-intensity storms is clearly shown over the southwestern Great Plains and the north-central parts of the country. The long-duration storms of the north Pacific coast are quite marked, while the oro-




graphic effect of the southern Appalachians is shown by an increase in time.

Figure 17 shows similar data for rains at the rate of 1.00 inch/hour. The most striking feature of this map is the remarkable uniformity in time, the general range being




only between 35 and 50 minutes. Local areas where a whole hour's rain is needed to make an inch are shown. Most western areas were ignored, as the relatively few occurrences did not permit good averages.

In general, the charts probably show numerous significant features, taken separately or together, that have been overlooked or neglected in this discussion.

Tables are included containing data for all the stations studied: Table 1, tabulations of the number of occurrences of rains at the two rates as well as the average amount, duration, and per hour rate for each. Table 2, tabulations of the maximum amount of precipitation at each rate, with its duration, and the maximum rate in inches per hour. Table 3, the monthly and annual number of rains at the 2.50/24 hour rate, and table 4 similar data for the 1.00/hour rate.

Extensive interpretation of these results has not been attempted because it is felt that users of the data would necessarily interpret them in relation to their specific problems.

TABLE 1.—*Total number of occurrences of rains of 2.50 inches in 24 hours or more and of rains of 1.00 inch per hour or more and average amount, duration, and rate per hour for each group*

| Station | Number | | Averages | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2.50 inches in 24 hours | | | | 1.00 inch in 1 hour | | | |
| | | | Duration | | | | Duration | | | |
| | 2.50 inches in 24 hours | 1.00 inch in 1 hour | Amount | Hours | Minutes | Rate inch/hour | Amount | Hours | Minutes | Rate inch/hour |
| Abilene | 39 | 77 | 3.67 | 13 | 17 | 0.28 | 1.37 | 0 | 41 | 2.01 |
| Albany | 10 | 13 | 2.95 | 17 | 22 | .17 | 1.23 | 0 | 35 | 2.11 |
| Alpena | 3 | 14 | 3.22 | 14 | 24 | .22 | 1.21 | 0 | 32 | 2.27 |
| Amarillo | 16 | 42 | 3.19 | 10 | 30 | .30 | 1.34 | 0 | 43 | 1.87 |
| Asheville | 18 | 36 | 3.62 | 19 | 10 | .19 | 1.25 | 0 | 42 | 1.79 |
| Atlanta | 55 | 76 | 3.48 | 16 | 36 | .21 | 1.43 | 0 | 44 | 1.95 |
| Atlantic City | 30 | 39 | 3.91 | 19 | 44 | .20 | 1.41 | 0 | 48 | 1.76 |
| Augusta | 44 | 97 | 3.44 | 13 | 33 | .25 | 1.33 | 0 | 40 | 1.99 |
| Baker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Baltimore | 44 | 51 | 3.35 | 17 | 22 | .19 | 1.29 | 0 | 42 | 1.84 |
| Binghamton | 13 | 25 | 3.23 | 17 | 10 | .19 | 1.20 | 0 | 37 | 1.94 |
| Birmingham | 81 | 129 | 3.45 | 14 | 30 | .24 | 1.30 | 0 | 44 | 1.77 |
| Bismarck | 7 | 14 | 3.15 | 17 | 31 | .18 | 1.30 | 0 | 32 | 2.44 |
| Block Island | 25 | 23 | 3.43 | 17 | 39 | .19 | 1.36 | 0 | 52 | 1.57 |
| Boise | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Boston | 27 | 13 | 3.59 | 19 | 49 | .18 | 1.57 | 1 | 06 | 1.43 |
| Buffalo | 8 | 10 | 2.77 | 12 | 31 | .22 | 1.41 | 0 | 52 | 1.63 |
| Burlington | 6 | 14 | 3.41 | 21 | 22 | .16 | 1.18 | 0 | 47 | 1.51 |
| Cairo | 42 | 61 | 3.54 | 14 | 38 | .24 | 1.30 | 0 | 48 | 1.62 |
| Canton | 9 | 9 | 2.90 | 16 | 35 | .17 | 1.37 | 0 | 41 | 2.01 |
| Charles City | 27 | 51 | 3.28 | 12 | 07 | .27 | 1.25 | 0 | 43 | 1.74 |
| Charleston | 63 | 124 | 3.74 | 12 | 38 | .30 | 1.44 | 0 | 48 | 1.80 |
| Charlotte | 47 | 78 | 3.37 | 15 | 59 | .21 | 1.32 | 0 | 43 | 1.84 |
| Chattanooga | 64 | 72 | 3.35 | 17 | 28 | .19 | 1.24 | 0 | 41 | 1.82 |
| Cheyenne | 4 | 8 | 2.94 | 18 | 51 | .16 | 1.31 | 0 | 39 | 2.02 |
| Chicago | 21 | 49 | 3.02 | 10 | 44 | .28 | 1.27 | 0 | 39 | 1.95 |
| Cincinnati | 26 | 37 | 3.11 | 13 | 22 | .23 | 1.25 | 0 | 44 | 1.71 |
| Cleveland | 8 | 16 | 3.06 | 10 | 24 | .29 | 1.27 | 0 | 40 | 1.90 |
| Columbia, Mo | 35 | 75 | 3.18 | 11 | 09 | .29 | 1.31 | 0 | 44 | 1.79 |
| Columbia, S. C | 37 | 80 | 3.35 | 14 | 12 | .24 | 1.37 | 0 | 43 | 1.91 |
| Columbus | 9 | 24 | 2.96 | 14 | 20 | .21 | 1.26 | 0 | 39 | 1.94 |
| Concordia | 15 | 59 | 3.47 | 10 | 0 | .35 | 1.36 | 0 | 40 | 2.04 |
| Corpus Christi | 39 | 96 | 4.46 | 12 | 38 | .35 | 1.52 | 0 | 49 | 1.86 |
| Davenport | 19 | 52 | 3.25 | 13 | 07 | .25 | 1.25 | 0 | 37 | 2.03 |
| Del Rio | 33 | 60 | 3.72 | 11 | 59 | .31 | 1.56 | 0 | 49 | 1.91 |
| Denver | 2 | 11 | 2.88 | 7 | 51 | .37 | 1.26 | 0 | 39 | 1.94 |
| Des Moines | 27 | 48 | 3.09 | 12 | 0 | .26 | 1.28 | 0 | 42 | 1.83 |
| Detroit | 10 | 25 | 3.22 | 11 | 01 | .29 | 1.34 | 0 | 44 | 1.83 |
| Devils Lake | 8 | 17 | 3.40 | 6 | 28 | .53 | 1.40 | 0 | 42 | 2.00 |
| Dodge City | 10 | 35 | 3.06 | 7 | 15 | .42 | 1.40 | 0 | 46 | 1.83 |
| Dubuque | 20 | 46 | 3.61 | 9 | 19 | .39 | 1.37 | 0 | 43 | 1.91 |
| Duluth | 9 | 20 | 3.22 | 12 | 57 | .25 | 1.28 | 0 | 45 | 1.71 |
| Eastport | 10 | 10 | 3.27 | 16 | 19 | .20 | 1.09 | 0 | 47 | 1.39 |
| Elkins | 18 | 34 | 3.08 | 11 | 10 | .28 | 1.29 | 0 | 49 | 1.58 |
| El Paso | 0 | 5 | 0 | 0 | 0 | 0 | 1.17 | 0 | 40 | 1.75 |
| Erie | 12 | 25 | 3.24 | 13 | 41 | .24 | 1.24 | 0 | 42 | 1.77 |
| Escanaba | 6 | 15 | 3.41 | 11 | 34 | .29 | 1.23 | 0 | 52 | 1.42 |
| Eureka | 18 | 0 | 3.29 | 22 | 34 | .15 | 0 | 0 | 0 | 0 |
| Evansville | 47 | 56 | 3.35 | 14 | 50 | .23 | 1.30 | 0 | 44 | 1.77 |
| Fort Smith | 38 | 59 | 3.39 | 15 | 41 | .22 | 1.22 | 0 | 44 | 1.66 |
| Fort Worth | 53 | 94 | 3.68 | 13 | 06 | .28 | 1.43 | 0 | 46 | 1.86 |
| Fresno | 0 | 2 | 0 | 0 | 0 | 0 | 1.04 | 0 | 22 | 2.83 |
| Galveston | 83 | 167 | 4.16 | 11 | 59 | .35 | 1.57 | 0 | 48 | 1.96 |
| Grand Junction | 1 | 0 | 2.50 | 23 | 59 | .10 | 0 | 0 | 0 | 0 |
| Grand Rapids | 13 | 27 | 2.81 | 9 | 43 | .29 | 1.21 | 0 | 44 | 1.65 |
| Green Bay | 11 | 29 | 3.15 | 8 | 47 | .36 | 1.15 | 0 | 41 | 1.68 |
| Harrisburg | 22 | 38 | 3.32 | 15 | 14 | .22 | 1.33 | 0 | 44 | 1.81 |
| Hartford | 31 | 27 | 3.10 | 17 | 53 | .17 | 1.25 | 0 | 36 | 2.08 |
| Hatteras | 90 | 119 | 3.81 | 15 | 02 | .25 | 1.48 | 0 | 49 | 1.81 |
| Havre | 3 | 2 | 2.61 | 21 | 21 | .12 | 1.40 | 1 | 00 | 1.40 |
| Helena | 2 | 1 | 3.26 | 21 | 52 | .15 | 1.00 | 0 | 50 | 1.20 |
| Honolulu | 43 | 50 | 4.08 | 16 | 14 | .25 | 1.51 | 0 | 53 | 1.71 |
| Huron | 10 | 26 | 3.20 | 8 | 23 | .38 | 1.31 | 0 | 41 | 1.92 |
| Indianapolis | 23 | 42 | 3.11 | 13 | 28 | .23 | 1.37 | 0 | 42 | 1.96 |
| Jacksonville | 67 | 154 | 3.66 | 13 | 57 | .26 | 1.36 | 0 | 41 | 1.99 |
| Kalispell | 0 | 1 | 0 | 0 | 0 | 0 | 1.00 | 0 | 27 | 2.22 |
| Kansas City | 44 | 68 | 3.51 | 12 | 14 | .29 | 1.46 | 0 | 49 | 1.79 |
| Keokuk | 27 | 56 | 3.20 | 10 | 38 | .30 | 1.34 | 0 | 43 | 1.87 |
| Key West | 62 | 144 | 4.17 | 11 | 51 | .35 | 1.49 | 0 | 49 | 1.82 |
| Knoxville | 35 | 45 | 3.05 | 13 | 18 | .23 | 1.31 | 0 | 41 | 1.92 |
| La Crosse | 22 | 47 | 3.07 | 8 | 04 | .38 | 1.32 | 0 | 46 | 1.72 |
| Lander‡ | 1 | 2 | 3.31 | 24 | 0 | .14 | 0.98 | 0 | 20 | 2.94 |
| Lincoln | 23 | 50 | 3.54 | 11 | 52 | .30 | 1.50 | 0 | 47 | 1.92 |
| Little Rock | 68 | 88 | 3.57 | 15 | 27 | .23 | 1.35 | 0 | 46 | 1.76 |
| Los Angeles | 24 | 3 | 3.37 | 19 | 52 | .17 | 1.12 | 0 | 42 | 1.60 |
| Louisville | 37 | 43 | 3.28 | 16 | 59 | .19 | 1.24 | 0 | 43 | 1.73 |
| Lynchburg* | 29 | 34 | 3.28 | 17 | 44 | .18 | 1.27 | 0 | 46 | 1.66 |
| Macon | 64 | 98 | 3.61 | 14 | 36 | .25 | 1.34 | 0 | 43 | 1.87 |
| Madison | 15 | 41 | 3.17 | 9 | 33 | .33 | 1.19 | 0 | 40 | 1.78 |
| Marquette | 7 | 13 | 3.17 | 18 | 53 | .17 | 1.31 | 0 | 47 | 1.67 |
| Memphis | 69 | 61 | 3.58 | 16 | 07 | .22 | 1.43 | 0 | 52 | 1.65 |
| Meridian | 95 | 157 | 3.74 | 12 | 57 | .29 | 1.36 | 0 | 44 | 1.86 |
| Milwaukee | 13 | 30 | 3.24 | 11 | 59 | .27 | 1.33 | 0 | 45 | 1.77 |
| Minneapolis | 14 | 41 | 3.43 | 8 | 18 | .41 | 1.25 | 0 | 39 | 1.92 |
| Mobile | 141 | 251 | 3.85 | 13 | 04 | .29 | 1.39 | 0 | 44 | 1.90 |
| Modena | 0 | 5 | 0 | 0 | 0 | 0 | 1.21 | 0 | 39 | 1.86 |
| Montgomery | 84 | 147 | 3.91 | 15 | 31 | .25 | 1.30 | 0 | 45 | 1.73 |
| Moorhead | 8 | 28 | 3.24 | 10 | 01 | .32 | 1.36 | 0 | 40 | 2.04 |
| Nantucket | 23 | 19 | 3.29 | 17 | 14 | .19 | 1.26 | 0 | 49 | 1.54 |
| Nashville | 53 | 69 | 3.21 | 14 | 28 | .22 | 1.26 | 0 | 42 | 1.80 |
| New Haven | 44 | 31 | 3.22 | 17 | 33 | .18 | 1.30 | 0 | 44 | 1.77 |
| New Orleans | 117 | 266 | 4.04 | 13 | 02 | .31 | 1.50 | 0 | 47 | 1.92 |
| New York | 41 | 40 | 3.32 | 16 | 33 | .20 | 1.31 | 0 | 42 | 1.87 |
| Norfolk | 36 | 67 | 3.37 | 14 | 34 | .23 | 1.29 | 0 | 46 | 1.68 |
| Northfield* | 8 | 7 | 3.68 | 16 | 59 | .22 | 1.25 | 0 | 26 | 2.89 |
| North Head | 14 | 0 | 2.99 | 23 | 36 | .13 | 0 | 0 | 0 | 0 |
| North Platte | 8 | 26 | 3.10 | 13 | 32 | .23 | 1.33 | 0 | 43 | 1.85 |
| Oklahoma City | 41 | 71 | 3.65 | 13 | 01 | .28 | 1.58 | 0 | 50 | 1.90 |
| Omaha | 16 | 43 | 3.47 | 8 | 41 | .40 | 1.36 | 0 | 49 | 1.66 |
| Oswego | 5 | 10 | 2.92 | 14 | 05 | .21 | 1.15 | 0 | 31 | 2.22 |
| Palestine | 61 | 101 | 3.64 | 13 | 45 | .26 | 1.38 | 0 | 44 | 1.88 |
| Parkersburg | 13 | 38 | 3.41 | 13 | 14 | .26 | 1.22 | 0 | 42 | 1.74 |
| Pensacola | 127 | 216 | 4.30 | 13 | 40 | .31 | 1.64 | 0 | 53 | 1.86 |
| Peoria | 23 | 64 | 3.27 | 10 | 40 | .31 | 1.28 | 0 | 42 | 1.83 |
| Philadelphia | 27 | 46 | 3.30 | 18 | 23 | .18 | 1.27 | 0 | 42 | 1.81 |
| Phoenix | 2 | 6 | 3.90 | 15 | 08 | .26 | 1.30 | 0 | 53 | 1.47 |
| Pittsburgh | 7 | 32 | 3.09 | 14 | 17 | .22 | 1.15 | 0 | 39 | 1.77 |
| Pocatello | 1 | 3 | 2.60 | 16 | 58 | .15 | 1.00 | 0 | 41 | 1.46 |
| Portland, Maine | 32 | 11 | 3.18 | 20 | 07 | .16 | 1.13 | 0 | 48 | 1.41 |
| Portland, Oreg | 12 | 1 | 3.48 | 23 | 56 | .15 | 1.12 | 0 | 33 | 2.04 |
| Providence | 18 | 22 | 3.37 | 16 | 55 | .20 | 1.47 | 0 | 54 | 1.63 |
| Pueblo | 2 | 16 | 2.82 | 6 | 14 | .45 | 1.26 | 0 | 40 | 1.89 |
| Raleigh | 48 | 104 | 3.29 | 12 | 21 | .27 | 1.30 | 0 | 39 | 2.00 |
| Rapid City | 11 | 15 | 3.53 | 17 | 20 | .20 | 1.36 | 0 | 44 | 1.86 |
| Reno | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond | 35 | 64 | 3.50 | 14 | 57 | .23 | 1.50 | 0 | 42 | 2.14 |
| Rochester | 5 | 11 | 2.99 | 11 | 32 | .26 | 1.37 | 0 | 45 | 1.83 |
| Roseburg | 6 | 1 | 3.57 | 26 | 13 | .14 | 1.10 | 0 | 15 | 4.40 |
| Roswell | 7 | 20 | 3.55 | 13 | 32 | .26 | 1.41 | 0 | 49 | 1.73 |
| Sacramento | 6 | 1 | 3.10 | 22 | 20 | .14 | 2.33 | 1 | 33 | 1.50 |
| St. Louis | 37 | 55 | 3.34 | 14 | 09 | .24 | 1.38 | 0 | 46 | 1.80 |
| Salt Lake City | 0 | 1 | 0 | 0 | 0 | 0 | 1.05 | 0 | 30 | 2.10 |
| San Antonio | 36 | 83 | 3.79 | 13 | 04 | .29 | 1.52 | 0 | 49 | 1.86 |
| San Diego | 4 | 1 | 3.09 | 20 | 48 | .15 | 1.04 | 0 | 50 | 1.25 |
| Sandusky | 12 | 28 | 3.56 | 11 | 18 | .32 | 1.39 | 0 | 45 | 1.85 |
| San Francisco | 7 | 1 | 3.16 | 21 | 50 | .14 | 1.03 | 0 | 55 | 1.12 |
| San Jose | 6 | 0 | 3.31 | 22 | 40 | .15 | 0 | 0 | 0 | 0 |
| San Juan | 66 | 145 | 4.10 | 11 | 51 | .35 | 1.41 | 0 | 45 | 1.88 |
| Santa Fe | 1 | 4 | 2.83 | 10 | 50 | .26 | 1.03 | 0 | 38 | 1.63 |
| Sault Ste. Marie | 5 | 8 | 3.44 | 19 | 26 | .18 | 1.06 | 0 | 45 | 1.41 |
| Savannah | 60 | 140 | 3.74 | 11 | 39 | .32 | 1.50 | 0 | 48 | 1.88 |
| Scranton | 18 | 37 | 3.25 | 15 | 59 | .20 | 1.18 | 0 | 39 | 1.82 |
| Seattle | 3 | 0 | 3.58 | 25 | 31 | .14 | 0 | 0 | 0 | 0 |
| Sheridan | 3 | 5 | 3.50 | 17 | 33 | .20 | 1.38 | 0 | 50 | 1.66 |
| Shreveport | 56 | 108 | 3.92 | 14 | 02 | .28 | 1.38 | 0 | 44 | 1.88 |
| Sioux City | 17 | 44 | 3.27 | 10 | 55 | .30 | 1.34 | 0 | 46 | 1.75 |
| Spokane | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Springfield, Ill | 26 | 51 | 3.43 | 11 | 26 | .30 | 1.41 | 0 | 45 | 1.88 |
| Springfield, Mo | 33 | 52 | 3.51 | 14 | 19 | .25 | 1.36 | 0 | 49 | 1.66 |
| Syracuse | 17 | 25 | 2.87 | 11 | 17 | .25 | 1.41 | 0 | 46 | 1.84 |
| Tampa | 77 | 201 | 3.65 | 11 | 12 | .33 | 1.45 | 0 | 42 | 2.07 |
| Tatoosh Island | 59 | 2 | 3.42 | 25 | 10 | .14 | 1.19 | 0 | 40 | 1.78 |
| Toledo | 19 | 28 | 3.15 | 13 | 19 | .24 | 1.32 | 0 | 50 | 1.58 |
| Topeka | 34 | 80 | 3.84 | 14 | 56 | .26 | 1.32 | 0 | 45 | 1.76 |
| Valentine | 7 | 18 | 3.45 | 8 | 20 | .41 | 1.47 | 0 | 45 | 1.96 |
| Vicksburg | 91 | 138 | 3.69 | 14 | 28 | .26 | 1.33 | 0 | 43 | 1.85 |
| Walla Walla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 35 | 66 | 3.46 | 14 | 19 | .24 | 1.41 | 0 | 41 | 2.06 |
| Wichita | 36 | 62 | 3.61 | 11 | 27 | .32 | 1.39 | 0 | 43 | 1.94 |
| Williston | 5 | 20 | 2.85 | 11 | 52 | .24 | 1.28 | 0 | 40 | 1.92 |
| Wilmington | 66 | 115 | 2.52 | 13 | 25 | .19 | 1.31 | 0 | 40 | 1.96 |
| Winnemucca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wytheville | 22 | 34 | 3.09 | 15 | 59 | .19 | 1.36 | 0 | 42 | 1.94 |
| Yellowstone Park | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Yuma | 2 | 5 | 3.83 | 10 | 20 | .37 | 1.80 | 1 | 26 | 1.26 |

‡Included for comparison.
*Broken record.

TABLE 2.—*Maximum amounts and corresponding durations at 2.50 inches in 24 hours or more and at 1.00 inch per hour or more and maximum rate in inches per hour with duration*

| Station | Maximum amounts: 2.50 inches in 24 hrs. Amount | Duration Hours | Duration Minutes | 1.00 in 1 hr. Amount | Duration Hours | Duration Minutes | Maximum rate in inch/hour: Amount | Minutes duration |
|---|---|---|---|---|---|---|---|---|
| Abilene | 6.78 | 23 | 58 | 3.86 | 1 | 50 | 4.50 | 28 |
| Albany | 4.23 | 18 | 0 | 1.64 | 0 | 35 | 4.68 | 15 |
| Alpena | 4.40 | 15 | 59 | 1.63 | 0 | 35 | 5.00 | 12 |
| Amarillo | 4.38 | 16 | 1 | 3.44 | 2 | 30 | 3.32 | 26 |
| Asheville | 7.92 | 19 | 52 | 2.65 | 0 | 45 | 5.93 | 18 |
| Atlanta | 11.75 | 57 | 4 | 3.02 | 2 | 18 | 4.77 | 18 |
| Atlantic City | 13.26 | 45 | 36 | 5.04 | 1 | 44 | 4.04 | 15 |
| Augusta | 9.82 | 16 | 15 | 3.31 | 2 | 10 | 4.67 | 37 |
| Baker | | | | | | | | |
| Baltimore | 7.62 | 19 | 36 | 3.57 | 2 | 0 | 5.00 | 12 |
| Binghamton | 4.55 | 23 | 54 | 2.09 | 0 | 44 | 4.84 | 16 |
| Birmingham | 11.39 | 38 | 57 | 2.94 | 1 | 50 | 4.90 | 24 |
| Bismarck | 3.76 | 16 | 1 | 2.96 | 0 | 45 | 4.81 | 15 |
| Block Island | 4.48 | 16 | 30 | 2.93 | 2 | 50 | 2.88 | 25 |
| Boise | | | | | | | | |
| Boston | 7.63 | 33 | 34 | 2.30 | 1 | 52 | 2.71 | 33 |
| Buffalo | 3.10 | 3 | 15 | 2.33 | 1 | 37 | 2.61 | 37 |
| Burlington | 4.70 | 25 | 12 | 1.95 | 0 | 52 | 3.75 | 16 |
| Cairo | 5.69 | 17 | 35 | 3.59 | 1 | 37 | 5.04 | 15 |
| Canton | 3.50 | 21 | 36 | 2.26 | 0 | 49 | 3.47 | 18 |
| Charles City | 5.32 | 9 | 50 | 2.70 | 1 | 13 | 3.60 | 25 |
| Charleston | 11.67 | 21 | 58 | 6.67 | 2 | 2 | 4.82 | 30 |
| Charlotte | 5.58 | 11 | 47 | 3.65 | 2 | 20 | 4.39 | 34 |
| Chattanooga | 7.36 | 40 | 15 | 2.46 | 0 | 45 | 5.31 | 20 |
| Cheyenne | 3.24 | 7 | 48 | 2.42 | 0 | 40 | 4.27 | 18 |
| Chicago | 4.34 | 12 | 47 | 2.30 | 1 | 0 | 4.64 | 15 |
| Cincinnati | 4.77 | 15 | 25 | 2.54 | 0 | 27 | 5.64 | 27 |
| Cleveland | 4.13 | 6 | 31 | 1.84 | 0 | 50 | 4.13 | 18 |
| Columbia, Mo | 6.61 | 8 | 54 | 5.16 | 3 | 24 | 4.37 | 14 |
| Columbia, S. C | 6.03 | 25 | 2 | 3.92 | 2 | 5 | 4.42 | 22 |
| Columbus | 3.71 | 16 | 18 | 2.70 | 1 | 20 | 3.98 | 19 |
| Concordia | 4.75 | 10 | 15 | 3.28 | 0 | 40 | 4.92 | 40 |
| Corpus Christi | 9.38 | 32 | 42 | 5.91 | 4 | 19 | 4.12 | 40 |
| Davenport | 5.00 | 14 | 1 | 2.68 | 0 | 46 | 4.80 | 20 |
| Del Rio | 8.88 | 11 | 16 | 5.02 | 1 | 7 | 5.23 | 25 |
| Denver | 3.00 | 8 | 43 | 2.14 | 0 | 54 | 4.50 | 22 |
| Des Moines | 4.87 | 5 | 8 | 3.08 | 1 | 29 | 4.00 | 18 |
| Detroit | 4.75 | 18 | 15 | 3.68 | 1 | 29 | 3.53 | 17 |
| Devils Lake | 4.53 | 4 | 43 | 2.62 | 0 | 38 | 6.08 | 22 |
| Dodge City | 3.51 | 2 | 33 | 2.66 | 1 | 26 | 4.10 | 29 |
| Dubuque | 5.48 | 5 | 4 | 2.64 | 0 | 45 | 4.03 | 18 |
| Duluth | 6.65 | 19 | 58 | 2.42 | 1 | 5 | 4.36 | 19 |
| Eastport | 4.09 | 15 | 30 | 1.36 | 0 | 45 | 2.97 | 22 |
| Elkins | 5.45 | 4 | 56 | 3.07 | 1 | 40 | †4.12 | 15 |
| El Paso | | | | 1.56 | 0 | 57 | 3.21 | 23 |
| Erie | 5.77 | 11 | 26 | 2.35 | 0 | 53 | 3.46 | 25 |
| Escanaba | 5.05 | 5 | 45 | 2.07 | 0 | 55 | 2.26 | 55 |
| Eureka | 5.15 | 27 | 43 | | | | | |
| Evansville | 10.77 | 41 | 43 | 3.01 | 1 | 48 | 3.82 | 25 |
| Fort Smith | 6.40 | 19 | 2 | 2.29 | 0 | 32 | 4.30 | 32 |
| Fort Worth | 9.57 | 17 | 12 | 5.72 | 2 | 11 | 4.06 | 25 |
| Fresno | | | | 1.06 | 0 | 20 | 3.18 | 20 |
| Galveston | 13.54 | 31 | 45 | 6.47 | 1 | 34 | 5.49 | 20 |
| Grand Junction | 2.50 | 23 | 59 | | | | | |
| Grand Rapids | 3.36 | 12 | 30 | 2.10 | 0 | 43 | 4.28 | 15 |
| Green Bay | 4.41 | 22 | 28 | 2.10 | 0 | 45 | 3.80 | 18 |
| Harrisburg | 5.28 | 20 | 2 | 2.42 | 1 | 17 | 4.88 | 15 |
| Hartford | 5.19 | 23 | 54 | 2.79 | 0 | 42 | 4.31 | 16 |
| Hatteras | 12.54 | 26 | 53 | 5.33 | 0 | 58 | 5.51 | 58 |
| Havre | 2.70 | 23 | 56 | 1.60 | 1 | 0 | 1.60 | 60 |
| Helena | 3.67 | 23 | 55 | 1.00 | 0 | 50 | 1.20 | 50 |
| Honolulu | 13.52 | 20 | 5 | 5.02 | 3 | 5 | 3.53 | 18 |
| Huron | 4.46 | 8 | 28 | 2.02 | 1 | 3 | 3.97 | 21 |
| Indianapolis | 4.45 | 13 | 42 | 2.59 | 0 | 52 | 4.12 | 15 |
| Jacksonville | 7.66 | 24 | 0 | 3.79 | 2 | 3 | 5.62 | 11 |
| Kalispell | | | | 1.00 | 0 | 27 | 2.22 | 27 |
| Kansas City | 7.03 | 9 | 52 | 4.50 | 1 | 50 | 4.53 | 16 |
| Keokuk | 5.88 | 15 | 1 | 2.89 | 1 | 24 | 4.37 | 14 |
| Key West | 14.00 | 26 | 14 | 6.49 | 5 | 31 | 4.76 | 15 |
| Knoxville | 6.20 | 12 | 8 | 3.19 | 1 | 51 | 4.20 | 20 |
| La Crosse | 3.96 | 10 | 32 | 3.14 | 1 | 25 | 5.12 | 13 |
| Lander | 3.31 | 24 | 0 | 1.22 | 0 | 21 | 3.49 | 21 |
| Lincoln | 8.38 | 8 | 35 | 3.85 | 2 | 44 | 3.75 | 49 |
| Little Rock | 9.58 | 19 | 0 | 4.23 | 2 | 47 | 4.00 | 15 |
| Los Angeles | 6.81 | 35 | 0 | 1.16 | 0 | 32 | 2.18 | 32 |
| Louisville | 5.00 | 22 | 34 | 1.93 | 1 | 12 | 4.58 | 22 |
| Lynchburg* | 7.59 | 18 | 26 | 2.62 | 1 | 25 | 4.12 | 16 |
| Macon | 8.36 | 16 | 20 | 6.25 | 1 | 55 | 4.52 | 15 |
| Madison | 5.20 | 10 | 20 | 2.24 | 1 | 13 | 3.84 | 25 |
| Marquette | 4.46 | 18 | 3 | 2.18 | 1 | 48 | 2.96 | 30 |

*Broken record.
†Partly estimated.

TABLE 2.—*Maximum amounts and corresponding durations at 2.50 inches in 24 hours or more and at 1.00 inch per hour or more and maximum rate in inches per hour with duration*—Continued

| Station | Maximum amounts: 2.50 inches in 24 hrs. Amount | Duration Hours | Duration Minutes | 1.00 in 1 hr. Amount | Duration Hours | Duration Minutes | Maximum rate in inch/hour: Amount | Minutes duration |
|---|---|---|---|---|---|---|---|---|
| Memphis | 9.30 | 18 | 16 | 5.68 | 4 | 0 | 5.78 | 11 |
| Meridian | 9.57 | 34 | 22 | 4.14 | 2 | 32 | 5.90 | 11 |
| Milwaukee | 5.76 | 11 | 23 | 2.94 | 1 | 27 | 4.00 | 18 |
| Minneapolis | 5.34 | 15 | 28 | 2.37 | 1 | 12 | 10.20 | 6 |
| Mobile | 11.59 | 19 | 17 | 4.75 | 2 | 42 | 5.40 | 15 |
| Modena | | | | 1.75 | 0 | 58 | 3.71 | 17 |
| Montgomery | 10.25 | 44 | 37 | 5.18 | 2 | 43 | 8.01 | 14 |
| Moorhead | {3.64 | 8 | 15 | 2.48 | 1 | 30 | 4.96 | 15 |
| | {3.64 | 2 | 47 | | | | | |
| Nantucket | 4.57 | 23 | 55 | 2.23 | 0 | 52 | 2.57 | 52 |
| Nashville | 5.19 | 24 | 22 | 3.24 | 1 | 32 | 4.85 | 14 |
| New Haven | 9.05 | 33 | 42 | 2.61 | 1 | 26 | 6.78 | 20 |
| New Orleans | 16.34 | 36 | 30 | 6.46 | 2 | 43 | 4.68 | 20 |
| New York | 5.18 | 21 | 48 | 2.41 | 0 | 35 | 4.13 | 35 |
| Norfolk | 6.64 | 17 | 16 | 2.28 | 0 | 48 | 3.72 | 25 |
| Northfield* | 3.38 | 24 | 0 | 1.64 | 0 | 15 | 6.56 | 15 |
| North Head | 3.69 | {24 | 0 | | | | | |
| | | {28 | 0 | | | | | |
| North Platte | 3.82 | 2 | 15 | 2.57 | 1 | 1 | 3.78 | 20 |
| Oklahoma City | 7.94 | 13 | 22 | 4.19 | 2 | 35 | 4.26 | 30 |
| Omaha | 6.80 | 10 | 6 | 4.08 | 2 | 54 | 5.24 | 26 |
| Oswego | 3.71 | 12 | 15 | 1.52 | 0 | 39 | 5.12 | 15 |
| Palestine | 6.98 | 29 | 34 | 4.31 | 2 | 26 | 4.89 | 14 |
| Parkersburg | 5.91 | 14 | 22 | 2.40 | 1 | 30 | 5.32 | 15 |
| Pensacola | 17.07 | 23 | 52 | 14.45 | 9 | 35 | 4.85 | 14 |
| Peoria | 5.52 | 8 | 32 | 3.09 | 1 | 33 | 4.00 | 15 |
| Philadelphia | 7.14 | 40 | 27 | 2.66 | 1 | 13 | 4.44 | 20 |
| Phoenix | 5.19 | 25 | 9 | 1.65 | 1 | 14 | 2.44 | 28 |
| Pittsburgh | 3.22 | 23 | 30 | 1.76 | 1 | 15 | 4.05 | 20 |
| Pocatello | 2.60 | 16 | 58 | 1.00 | 0 | {32<br>{38<br>{52 | 1.88 | 32 |
| Portland, Me | 6.61 | 37 | 5 | 1.48 | 0 | 23 | 3.86 | 23 |
| Portland, Oreg | 5.72 | 25 | 33 | 1.12 | 0 | 33 | 2.04 | 33 |
| Providence | 6.17 | 18 | 51 | 3.17 | 1 | 38 | 2.82 | 37 |
| Pueblo | 2.93 | 10 | 38 | 2.04 | 0 | 48 | 2.95 | 36 |
| Raleigh | 9.04 | 36 | 5 | 4.17 | 2 | 0 | 6.69 | 13 |
| Rapid City | 5.57 | 8 | 42 | 2.72 | 2 | 9 | 3.22 | 19 |
| Reno | | | | | | | | |
| Richmond | 7.26 | 13 | 46 | 6.98 | 2 | 35 | 4.36 | 30 |
| Rochester | 3.13 | 8 | 9 | 1.98 | 0 | 30 | 3.96 | 30 |
| Roseburg | 5.49 | 32 | 28 | 1.10 | 0 | 15 | 4.40 | 15 |
| Roswell | 5.57 | 17 | 12 | 2.92 | 2 | 9 | 4.02 | 20 |
| Sacramento | 3.35 | 20 | 44 | 2.33 | 1 | 33 | 1.50 | 93 |
| St Louis | 7.02 | 23 | 43 | 3.47 | 1 | 0 | 4.33 | 45 |
| Salt Lake City | | | | 1.05 | 0 | 30 | 2.10 | 30 |
| San Antonio | 7.22 | 25 | 3 | 4.39 | 2 | 21 | 5.44 | 15 |
| San Diego | 3.24 | 24 | 0 | 1.04 | 0 | 50 | 1.25 | 50 |
| Sandusky | 5.95 | 9 | 42 | 3.76 | 1 | 6 | 3.45 | 20 |
| San Francisco | 3.52 | 23 | 30 | 1.03 | 0 | 55 | 1.12 | 55 |
| San Jose | 4.56 | 24 | 0 | | | | | |
| San Juan | 10.55 | 15 | 5 | 4.52 | 1 | 41 | 6.67 | 9 |
| Santa Fe | 2.83 | 10 | 50 | 1.07 | 0 | 37 | 2.22 | 27 |
| Sault Ste. Marie | 5.64 | 20 | 39 | 1.22 | 1 | 0 | 2.33 | 28 |
| Savannah | 11.44 | 19 | 40 | 5.18 | 3 | 45 | 4.61 | 19 |
| Scranton | 5.09 | 24 | 0 | 2.32 | 0 | 43 | 4.37 | 14 |
| Seattle | 4.08 | 27 | 16 | | | | | |
| Sheridan | 4.41 | 7 | 44 | 2.49 | 1 | 45 | 2.61 | 23 |
| Shreveport | 18.03 | 39 | 4 | 4.04 | 1 | 43 | 6.68 | 16 |
| Sioux City | 4.69 | 10 | 23 | 3.00 | 1 | 42 | 5.30 | 31 |
| Spokane | | | | | | | | |
| Springfield, Ill | 5.94 | 6 | 52 | 2.64 | 1 | 33 | 4.20 | 16 |
| Springfield, Mo | 6.55 | 10 | 35 | 4.33 | 3 | 0 | 3.33 | 27 |
| Syracuse | 4.79 | 7 | 55 | 4.52 | 2 | 13 | 4.27 | 17 |
| Tampa | 7.81 | 14 | 55 | 4.33 | 1 | 12 | 5.06 | 23 |
| Tatoosh Island | 10.02 | 53 | 49 | 1.38 | 0 | 55 | 2.50 | 24 |
| Toledo | 5.98 | 15 | 54 | 3.40 | 0 | 46 | 4.43 | 46 |
| Topeka | 8.08 | 16 | 32 | 3.36 | 1 | 5 | 4.37 | 14 |
| Valentine | 4.21 | 7 | 2 | 3.16 | 1 | 7 | 4.11 | 40 |
| Vicksburg | 6.92 | 5 | 23 | 4.03 | 1 | 37 | 6.71 | 11 |
| Walla Walla | | | | | | | | |
| Washington, D. C | 8.33 | 28 | 27 | 3.43 | 1 | 36 | 5.51 | 17 |
| Wichita | 7.99 | 10 | 36 | 4.88 | 2 | 55 | 4.96 | 15 |
| Williston | 3.03 | 12 | 14 | 2.82 | 0 | 50 | 4.04 | 15 |
| Wilmington | 6.43 | 19 | 44 | 4.94 | 1 | 49 | 8.55 | 8 |
| Winnemucca | | | | | | | | |
| Wytheville | 4.07 | 21 | 16 | 2.63 | 1 | 20 | 3.79 | 19 |
| Yellowstone Park | | | | | | | | |
| Yuma | 4.01 | 7 | 18 | 2.12 | 1 | 50 | 1.83 | 60 |

*Broken record.

TABLE 3.—*Number of occurrences of rainfall of 2.50 inches in 24 hours or over*

| STATION | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abilene | ---- | ---- | 1 | 3 | 9 | 3 | 2 | 7 | 6 | 5 | ---- | 3 | 39 |
| Albany | ---- | ---- | ---- | ---- | ---- | 2 | 2 | 1 | 3 | 1 | 1 | ---- | 10 |
| Alpena | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | 1 | ---- | ---- | 3 |
| Amarillo | ---- | ---- | 1 | 1 | 3 | 2 | 8 | 4 | 4 | ---- | ---- | ---- | 16 |
| Asheville | ---- | ---- | ---- | ---- | 4 | 1 | ---- | 4 | 3 | 3 | ---- | 1 | 18 |
| Atlanta | 6 | 5 | 7 | 5 | 4 | 3 | 3 | 4 | 4 | 5 | 2 | 7 | 55 |
| Atlantic City | ---- | ---- | ---- | 2 | 2 | 3 | 3 | 7 | 5 | 3 | 3 | 2 | 30 |
| Augusta | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 7 | 7 | 6 | 1 | ---- | 44 |
| Baker [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Baltimore | 2 | 1 | 1 | 5 | 1 | 3 | 2 | 13 | 6 | 5 | 4 | 1 | 44 |
| Binghamton | ---- | ---- | ---- | ---- | 1 | 1 | 2 | 1 | 2 | 4 | 2 | ---- | 13 |
| Birmingham | 7 | 5 | 12 | 5 | 9 | 5 | 5 | 3 | 6 | 7 | 6 | 11 | 81 |
| Bismarck | ---- | ---- | ---- | ---- | 1 | 4 | ---- | 2 | ---- | ---- | ---- | ---- | 7 |
| Block Island | 1 | 1 | 1 | 2 | 1 | 2 | 4 | 5 | 4 | 2 | 2 | ---- | 25 |
| Boise [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Boston | 1 | ---- | ---- | 3 | 2 | 5 | 4 | 3 | 5 | 2 | 1 | 1 | 27 |
| Buffalo | ---- | ---- | 1 | ---- | ---- | 1 | 4 | 1 | ---- | ---- | ---- | ---- | 8 |
| Burlington | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | 1 | 2 | 2 | ---- | 6 |
| Cairo | 4 | 2 | 7 | 1 | 4 | 5 | 2 | 4 | 4 | 4 | 3 | 2 | 42 |
| Canton | ---- | ---- | ---- | ---- | ---- | 3 | 1 | 1 | 2 | 1 | 1 | ---- | 9 |
| Charles City | ---- | ---- | ---- | ---- | 2 | 4 | 3 | 10 | 5 | 1 | 2 | ---- | 27 |
| Charleston | 1 | 4 | 1 | 2 | 6 | 6 | 15 | 10 | 11 | 5 | 2 | ---- | 63 |
| Charlotte | 2 | 2 | 2 | 3 | 6 | 5 | 6 | 7 | 7 | 4 | 1 | 2 | 47 |
| Chattanooga | 6 | 4 | 10 | 8 | 1 | 2 | 5 | 5 | 2 | 6 | 6 | 9 | 64 |
| Cheyenne | ---- | ---- | ---- | 2 | 1 | 1 | ---- | ---- | ---- | ---- | ---- | ---- | 4 |
| Chicago | ---- | ---- | 1 | 2 | 1 | 6 | ---- | 5 | 4 | 1 | 1 | ---- | 21 |
| Cincinnati | 3 | 1 | 2 | 1 | 2 | 1 | 7 | 4 | 2 | 1 | ---- | 2 | 26 |
| Cleveland | ---- | ---- | 1 | ---- | ---- | 2 | 3 | 1 | 1 | ---- | ---- | ---- | 8 |
| Columbia, Mo | ---- | ---- | 1 | 3 | 5 | 5 | 2 | 5 | 9 | 3 | 1 | 1 | 35 |
| Columbia, S. C | 1 | 2 | 1 | 4 | 1 | 4 | 6 | 8 | 5 | 3 | ---- | 2 | 37 |
| Columbus | ---- | ---- | 1 | ---- | 1 | 1 | 2 | 2 | ---- | 2 | ---- | ---- | 9 |
| Concordia | ---- | ---- | ---- | 1 | 1 | 3 | ---- | 7 | 2 | 1 | ---- | ---- | 15 |
| Corpus Christi | ---- | ---- | 1 | 2 | 5 | 8 | 3 | ---- | 11 | 6 | 1 | 2 | 39 |
| Davenport | ---- | ---- | 1 | ---- | ---- | 3 | 3 | 6 | 4 | ---- | 2 | ---- | 19 |
| Del Rio | ---- | 1 | ---- | 1 | 5 | 6 | 4 | 3 | 7 | 5 | 1 | ---- | 33 |
| Denver | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | ---- | ---- | ---- | ---- | 2 |
| Des Moines | ---- | ---- | 1 | ---- | 7 | 4 | 3 | 5 | 5 | 1 | 1 | ---- | 27 |
| Detroit | ---- | ---- | ---- | ---- | 1 | ---- | 4 | 2 | 2 | ---- | 1 | ---- | 10 |
| Devils Lake | ---- | ---- | ---- | ---- | 1 | 2 | 1 | 2 | 2 | ---- | ---- | ---- | 8 |
| Dodge City | ---- | ---- | ---- | 1 | 1 | 2 | 2 | 4 | ---- | ---- | ---- | ---- | 10 |
| Dubuque | ---- | ---- | 1 | ---- | 1 | 2 | 2 | 8 | 5 | 1 | ---- | ---- | 20 |
| Duluth | ---- | ---- | ---- | ---- | ---- | ---- | 5 | 2 | 2 | ---- | ---- | ---- | 9 |
| Eastport | ---- | ---- | ---- | ---- | ---- | 2 | ---- | 3 | 1 | 3 | 1 | ---- | 10 |
| Elkins | ---- | 1 | 1 | 1 | 1 | ---- | 9 | 2 | 2 | 1 | ---- | ---- | 18 |
| El Paso [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Erie | ---- | ---- | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 | ---- | ---- | 12 |
| Escanaba | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 2 | 2 | ---- | ---- | ---- | 6 |
| Eureka | 3 | 5 | 1 | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 4 | 4 | 18 |
| Evansville | 4 | 1 | 4 | 4 | 5 | 3 | 6 | 3 | 7 | 4 | 2 | 4 | 47 |
| Fort Smith | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 4 | 8 | 3 | 4 | 5 | 38 |
| Fort Worth | 2 | ---- | 2 | 6 | 9 | 9 | 5 | 3 | 7 | 4 | 4 | 2 | 53 |
| Fresno [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Galveston | 6 | 3 | 6 | 7 | 8 | 8 | 7 | 5 | 14 | 10 | 4 | 5 | 83 |
| Grand Junction | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | 1 |
| Grand Rapids | ---- | ---- | ---- | 2 | 2 | 2 | 2 | 3 | 1 | ---- | 1 | ---- | 13 |
| Green Bay | ---- | ---- | ---- | ---- | ---- | 5 | 2 | 3 | 1 | ---- | ---- | ---- | 11 |
| Harrisburg | ---- | 1 | ---- | 1 | 1 | 2 | 1 | 5 | 4 | 5 | 2 | ---- | 22 |
| Hartford | ---- | 2 | 1 | 2 | 3 | 1 | 3 | 5 | 5 | 5 | 4 | ---- | 31 |
| Hatteras | 4 | 2 | 3 | 3 | 7 | 11 | 11 | 10 | 16 | 10 | 6 | 7 | 90 |
| Havre | ---- | ---- | ---- | ---- | ---- | 2 | ---- | ---- | 1 | ---- | ---- | ---- | 3 |
| Helena | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | ---- | ---- | ---- | ---- | 2 |
| Honolulu | 8 | 5 | 8 | 2 | ---- | 1 | ---- | ---- | 2 | 3 | 5 | 9 | 43 |
| Huron | ---- | ---- | ---- | ---- | 2 | 5 | 2 | 1 | ---- | ---- | ---- | ---- | 10 |
| Indianapolis | 2 | ---- | 3 | 1 | 1 | 2 | 5 | 3 | 2 | 3 | 1 | ---- | 23 |
| Jacksonville | 1 | 1 | 2 | 1 | 4 | 10 | 12 | 7 | 14 | 10 | 1 | 4 | 67 |
| Kalispell [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Kansas City | ---- | ---- | 3 | 2 | 9 | 9 | 4 | 3 | 8 | 3 | 3 | ---- | 44 |
| Keokuk | ---- | ---- | 1 | ---- | 4 | 7 | 4 | 3 | 7 | ---- | 1 | ---- | 27 |
| Key West | 1 | ---- | ---- | 2 | 10 | 11 | 3 | 4 | 11 | 16 | 3 | 1 | 62 |
| Knoxville | 1 | 1 | 4 | 3 | 2 | 6 | 8 | 2 | 1 | 2 | 1 | 4 | 35 |
| La Crosse | ---- | ---- | ---- | ---- | 1 | 4 | 3 | 7 | 6 | 1 | ---- | ---- | 22 |
| Lander | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| Lincoln | ---- | ---- | ---- | ---- | 3 | 5 | 5 | 3 | 4 | ---- | 3 | ---- | 23 |
| Little Rock | 9 | 4 | 6 | 9 | 10 | 2 | 3 | 3 | 4 | 7 | 4 | 7 | 68 |
| Los Angeles | 10 | 6 | 1 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 24 |
| Louisville | 5 | 4 | 4 | 2 | 4 | 2 | 3 | 2 | 1 | 3 | 2 | 5 | 37 |
| *Lynchburg | ---- | 1 | 2 | 3 | 2 | 1 | 5 | 5 | 3 | 5 | 2 | ---- | 29 |
| Macon | 6 | 6 | 10 | 7 | 2 | 4 | 6 | 5 | 8 | 4 | 4 | 2 | 64 |
| Madison | ---- | ---- | ---- | 1 | 1 | ---- | 3 | 5 | 5 | ---- | ---- | ---- | 15 |
| Marquette | ---- | ---- | ---- | 1 | 1 | 2 | ---- | 2 | 1 | ---- | ---- | ---- | 7 |
| Memphis | 9 | 1 | 7 | 11 | 7 | 1 | 4 | 2 | 5 | 6 | 6 | 10 | 69 |
| Meridian | 7 | 7 | 9 | 9 | 13 | 8 | 9 | 7 | 3 | 7 | 6 | 10 | 95 |
| Milwaukee | ---- | ---- | ---- | ---- | 1 | 4 | 1 | 1 | 4 | 1 | 1 | ---- | 13 |
| Minneapolis | ---- | ---- | ---- | ---- | 1 | 3 | 4 | 3 | 2 | 1 | ---- | ---- | 14 |
| Mobile | 11 | 5 | 16 | 16 | 10 | 11 | 16 | 10 | 11 | 13 | 13 | 9 | 141 |
| Modena [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Montgomery | 11 | 9 | 17 | 12 | 2 | 6 | 5 | 3 | 6 | 2 | 3 | 8 | 84 |
| Moorhead | ---- | ---- | ---- | ---- | 1 | 4 | 1 | 2 | ---- | ---- | ---- | ---- | 8 |
| Nantucket | ---- | 1 | ---- | 1 | 1 | 1 | 3 | 4 | 3 | 7 | 2 | ---- | 23 |
| Nashville | 8 | 4 | 5 | 5 | 3 | 4 | 5 | 5 | 2 | 3 | 4 | 5 | 53 |
| New Haven | 1 | 1 | 3 | 3 | 3 | 4 | 7 | 5 | 5 | 7 | 3 | 2 | 44 |
| New Orleans | 9 | 7 | 12 | 16 | 13 | 8 | 10 | 8 | 8 | 10 | 6 | 10 | 117 |
| New York | ---- | 2 | 3 | 1 | 1 | 1 | 6 | 11 | 7 | 7 | 1 | 1 | 41 |
| Norfolk | 1 | 1 | ---- | 1 | 1 | 9 | 9 | 7 | 5 | 1 | 1 | ---- | 36 |
| Northfield* | ---- | ---- | 1 | ---- | ---- | ---- | ---- | 3 | 1 | 2 | 1 | ---- | 8 |
| North Head | 4 | 2 | 3 | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | 3 | 14 |
| North Platte | ---- | ---- | ---- | 2 | ---- | ---- | 1 | 2 | 1 | 2 | ---- | ---- | 8 |
| Oklahoma City | 1 | ---- | 1 | 3 | 9 | 4 | 2 | 4 | 5 | 5 | 5 | 2 | 41 |
| Omaha | ---- | ---- | ---- | ---- | 1 | 6 | 2 | 2 | 4 | ---- | 1 | ---- | 16 |

[1] None.

*Broken record.

TABLE 3.—*Number of occurrences of rainfall of 2.50 inches in 24 hours or over*—Continued

| STATION | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oswego | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 1 | ---- | 2 | ---- | ---- | 5 |
| Palestine | 2 | 2 | 5 | 6 | 8 | 7 | 4 | 2 | 5 | 7 | 7 | 6 | 61 |
| Parkersburg | 1 | 1 | ---- | 2 | ---- | 2 | 3 | 2 | 2 | ---- | ---- | ---- | 13 |
| Pensacola | 7 | 6 | 8 | 14 | 6 | 7 | 10 | 17 | 18 | 17 | 6 | 11 | 127 |
| Peoria | ---- | ---- | 1 | ---- | 5 | 3 | 4 | 3 | 5 | 1 | 1 | ---- | 23 |
| Philadelphia | 1 | 3 | 3 | ---- | 2 | 1 | 4 | 7 | 3 | 1 | ---- | 2 | 27 |
| Phoenix | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | ---- | ---- | ---- | 2 |
| Pittsburgh | ---- | ---- | ---- | ---- | ---- | 2 | 3 | ---- | 1 | 1 | ---- | ---- | 7 |
| Pocatello | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | 1 |
| Portland, Me | 3 | 3 | 6 | 3 | 2 | 2 | 3 | ---- | 3 | 2 | 4 | 1 | 32 |
| Portland, Oreg | 3 | ---- | 1 | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | 6 | 12 |
| Providence | 1 | ---- | ---- | ---- | ---- | 3 | 3 | 3 | 4 | 1 | 1 | 2 | 18 |
| Pueblo | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | ---- | ---- | ---- | ---- | 2 |
| Raleigh | 1 | 1 | 2 | 5 | 2 | 3 | 9 | 10 | 9 | 2 | 2 | 2 | 48 |
| Rapid City | ---- | ---- | ---- | ---- | 4 | 2 | 2 | ---- | 2 | ---- | 1 | ---- | 11 |
| Reno [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Richmond | 2 | 1 | 1 | 2 | ---- | 4 | 6 | 9 | 5 | 3 | 1 | 1 | 35 |
| Rochester | ---- | ---- | ---- | ---- | 1 | 1 | ---- | 2 | ---- | 1 | ---- | ---- | 5 |
| Roseburg | 1 | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 3 | ---- | 6 |
| Roswell | ---- | ---- | 1 | 2 | ---- | 1 | ---- | 1 | 2 | ---- | ---- | ---- | 7 |
| Sacramento | 2 | 1 | ---- | 1 | ---- | ---- | ---- | ---- | 1 | ---- | ---- | 1 | 6 |
| St. Louis | 2 | ---- | 2 | 5 | 1 | 4 | 3 | 6 | 6 | 4 | 2 | 2 | 37 |
| Salt Lake City [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| San Antonio | ---- | 1 | 2 | 4 | 4 | 6 | 5 | 5 | 4 | 3 | 2 | ---- | 36 |
| San Diego | ---- | 1 | ---- | 1 | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | 4 |
| Sandusky | ---- | ---- | 1 | ---- | ---- | 4 | 3 | 2 | ---- | 2 | ---- | ---- | 12 |
| San Francisco | 2 | 2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 7 |
| San Jose | 2 | 1 | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 6 |
| San Juan | 6 | 2 | 2 | 9 | 11 | 3 | 5 | 4 | 7 | 2 | 10 | 5 | 66 |
| Santa Fe | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | 1 |
| Sault Ste. Marie | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 2 | 1 | ---- | ---- | 5 |
| Savannah | ---- | 5 | 1 | ---- | 1 | 9 | 8 | 15 | 13 | 4 | 2 | 2 | 60 |
| Scranton | ---- | 1 | 1 | ---- | ---- | 1 | 6 | 3 | 2 | 3 | 1 | ---- | 18 |
| Seattle | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 2 | 3 |
| Sheridan | ---- | ---- | ---- | 1 | ---- | ---- | 1 | ---- | 1 | ---- | ---- | ---- | 3 |
| Shreveport | 4 | 1 | 7 | 6 | 7 | 2 | 7 | 3 | 5 | 3 | 5 | 6 | 56 |
| Sioux City | ---- | ---- | ---- | 1 | 1 | 3 | 4 | 2 | 5 | ---- | 1 | ---- | 17 |
| Spokane [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Springfield, Ill | ---- | ---- | 5 | ---- | 2 | 4 | 5 | 2 | 7 | 1 | ---- | ---- | 26 |
| Springfield, Mo | 1 | ---- | 4 | 1 | 4 | 8 | 2 | 5 | 2 | 3 | 1 | 2 | 33 |
| Syracuse | 1 | ---- | ---- | 1 | ---- | 4 | 4 | 1 | 3 | 3 | ---- | ---- | 17 |
| Tampa | 2 | 6 | 5 | 3 | 8 | 10 | 12 | 13 | 11 | 5 | 2 | ---- | 77 |
| Tatoosh Island | 12 | 10 | 1 | ---- | ---- | ---- | ---- | ---- | 3 | 9 | 11 | 13 | 59 |
| Toledo | ---- | ---- | 2 | 2 | 2 | 3 | ---- | 4 | 5 | 1 | ---- | ---- | 19 |
| Topeka | ---- | 1 | 2 | 2 | 4 | 4 | 3 | 4 | 8 | 2 | 4 | ---- | 34 |
| Valentine | ---- | ---- | ---- | ---- | 1 | ---- | 2 | 2 | 1 | 1 | ---- | ---- | 7 |
| Vicksburg | 8 | 11 | 14 | 12 | 11 | 3 | 4 | 4 | 3 | 5 | 7 | 9 | 91 |
| Walla Walla [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Washington, D. C | 1 | ---- | 1 | 3 | 2 | 3 | 6 | 7 | 7 | 4 | 1 | ---- | 35 |
| Wichita | ---- | ---- | 1 | 1 | 5 | 8 | 3 | 5 | 5 | 2 | 6 | ---- | 36 |
| Williston | ---- | ---- | ---- | ---- | 1 | 3 | ---- | 1 | ---- | ---- | ---- | ---- | 5 |
| Wilmington | 4 | 1 | 1 | 4 | 3 | 3 | 11 | 10 | 15 | 7 | 5 | 2 | 66 |
| Winnemucca [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Wytheville | ---- | ---- | 1 | ---- | ---- | 3 | 2 | 2 | 4 | 8 | 2 | ---- | 22 |
| Yellowstone Park [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Yuma | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | ---- | ---- | ---- | 2 |

[1] None.

TABLE 4.—*Number of occurrences of rainfall of 1.00 inch in 1 hour or more*

| Station | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abilene | ---- | ---- | ---- | 10 | 23 | 10 | 6 | 12 | 8 | 5 | 3 | ---- | 77 |
| Albany | ---- | ---- | ---- | ---- | 2 | 2 | 2 | 3 | 3 | 1 | ---- | ---- | 13 |
| Alpena | ---- | ---- | ---- | ---- | 2 | 5 | 3 | 3 | 1 | ---- | ---- | ---- | 14 |
| Amarillo | ---- | ---- | ---- | 2 | 6 | 10 | 6 | 13 | 5 | ---- | ---- | ---- | 42 |
| Asheville | ---- | ---- | ---- | ---- | 3 | 10 | 6 | 9 | 6 | 2 | ---- | ---- | 36 |
| Atlanta | 2 | 2 | 5 | 4 | 6 | 13 | 11 | 12 | 8 | 7 | 3 | 3 | 76 |
| Atlantic City | ---- | ---- | ---- | ---- | ---- | 11 | 12 | 10 | 3 | 2 | ---- | 1 | 39 |
| Augusta | ---- | 2 | 3 | 2 | 8 | 20 | 26 | 20 | 8 | 7 | 1 | ---- | 97 |
| Baker [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Baltimore | ---- | ---- | ---- | ---- | 5 | 6 | 10 | 22 | 5 | 3 | ---- | ---- | 51 |
| Binghampton | ---- | ---- | ---- | ---- | 3 | 4 | 6 | 8 | 4 | ---- | ---- | ---- | 25 |
| Birmingham | 5 | 2 | 11 | 10 | 11 | 15 | 21 | 20 | 11 | 6 | 7 | 10 | 129 |
| Bismarck | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 4 | 1 | ---- | ---- | ---- | 14 |
| Block Island | ---- | ---- | ---- | 1 | 2 | 3 | 8 | 7 | 2 | ---- | ---- | ---- | 23 |
| Boise [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Boston | ---- | ---- | ---- | ---- | ---- | 1 | 6 | 4 | 1 | 1 | ---- | ---- | 13 |
| Buffalo | ---- | ---- | ---- | ---- | ---- | 1 | 5 | 2 | 2 | ---- | ---- | ---- | 10 |
| Burlington | ---- | ---- | ---- | ---- | ---- | 3 | 5 | 2 | 3 | 1 | ---- | ---- | 14 |
| Cairo | ---- | ---- | 2 | 2 | 4 | 8 | 12 | 17 | 9 | 3 | 4 | ---- | 61 |
| Canton | ---- | ---- | ---- | ---- | ---- | 2 | 5 | 2 | ---- | ---- | ---- | ---- | 9 |
| Charles City | ---- | ---- | ---- | 1 | 4 | 13 | 11 | 15 | 6 | ---- | 1 | ---- | 51 |
| Charleston | 1 | 1 | 2 | 4 | 14 | 13 | 34 | 29 | 16 | 8 | 2 | ---- | 124 |
| Charlotte | 1 | ---- | ---- | 1 | 5 | 17 | 16 | 24 | 9 | 4 | 1 | ---- | 78 |
| Chattanooga | 1 | ---- | 6 | 11 | 13 | 6 | 17 | 12 | 4 | 2 | ---- | ---- | 72 |
| Cheyenne | ---- | ---- | ---- | ---- | ---- | 3 | 2 | 1 | 2 | ---- | ---- | ---- | 8 |
| Chicago | ---- | ---- | ---- | ---- | 2 | 13 | 9 | 19 | 4 | ---- | 2 | ---- | 49 |
| Cincinnati | ---- | ---- | 1 | ---- | 4 | 3 | 16 | 6 | 5 | 2 | ---- | ---- | 37 |
| Cleveland | ---- | ---- | ---- | ---- | ---- | 4 | 7 | 5 | ---- | ---- | ---- | ---- | 16 |

[1] None

TABLE 4.—*Number of occurrences of rainfall of 1.00 inch in 1 hour or more*—Continued

| Station | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Columbia, Mo. | ---- | ---- | 2 | 2 | 5 | 16 | 9 | 19 | 19 | 2 | 1 | ---- | 75 |
| Columbia, S. C. | ---- | 2 | 1 | ---- | 5 | 15 | 27 | 22 | 7 | 1 | ---- | ---- | 80 |
| Columbus | ---- | ---- | ---- | ---- | 1 | 4 | 6 | 10 | 3 | ---- | ---- | ---- | 24 |
| Concordia | ---- | ---- | ---- | 3 | 7 | 17 | 11 | 11 | 8 | 2 | ---- | ---- | 59 |
| Corpus Christi | 1 | ---- | 1 | 7 | 25 | 12 | 6 | 4 | 19 | 11 | 6 | 4 | 96 |
| Davenport | ---- | ---- | ---- | 3 | 1 | 11 | 13 | 11 | 10 | 3 | ---- | ---- | 52 |
| Del Rio | ---- | 1 | 3 | 4 | 12 | 11 | 8 | 4 | 6 | 7 | 4 | ---- | 60 |
| Denver | ---- | ---- | ---- | ---- | 1 | 1 | 6 | 3 | ---- | ---- | ---- | ---- | 11 |
| Des Moines | ---- | ---- | ---- | ---- | 10 | 11 | 7 | 8 | 9 | 2 | 1 | ---- | 48 |
| Detroit | ---- | ---- | ---- | ---- | ---- | 6 | 8 | 5 | 4 | 2 | ---- | ---- | 25 |
| Devils Lake | ---- | ---- | ---- | ---- | ---- | 3 | 5 | 5 | 4 | ---- | ---- | ---- | 17 |
| Dodge City | ---- | ---- | ---- | 2 | 4 | 9 | 9 | 8 | 3 | ---- | ---- | ---- | 35 |
| Dubuque | ---- | ---- | 1 | ---- | 4 | 9 | 9 | 13 | 8 | 2 | ---- | ---- | 46 |
| Duluth | ---- | ---- | ---- | ---- | 1 | 4 | 10 | 2 | 3 | ---- | ---- | ---- | 20 |
| Eastport | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 1 | 3 | 3 | ---- | ---- | 10 |
| Elkins | ---- | ---- | ---- | ---- | 1 | 8 | 14 | 7 | 4 | ---- | ---- | ---- | 34 |
| El Paso | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 1 | ---- | ---- | ---- | ---- | 5 |
| Erie | ---- | ---- | ---- | ---- | ---- | 6 | 8 | 8 | 3 | ---- | ---- | ---- | 25 |
| Escanaba | ---- | ---- | ---- | ---- | ---- | 1 | 4 | 3 | 7 | ---- | ---- | ---- | 15 |
| Eureka [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Evansville | ---- | ---- | 1 | 3 | 6 | 11 | 9 | 14 | 8 | 2 | 2 | ---- | 56 |
| Fort Smith | ---- | ---- | 1 | 4 | 6 | 10 | 6 | 10 | 13 | 5 | 4 | ---- | 59 |
| Fort Worth | ---- | 1 | 3 | 8 | 16 | 22 | 7 | 13 | 13 | 5 | 5 | 1 | 94 |
| Fresno | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | 2 |
| Galveston | 8 | 3 | 11 | 17 | 21 | 16 | 16 | 13 | 25 | 21 | 6 | 10 | 167 |
| Grand Junction [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Grand Rapids | ---- | ---- | ---- | 2 | 3 | 6 | 6 | 6 | 3 | ---- | 1 | ---- | 27 |
| Green Bay | ---- | ---- | ---- | ---- | 2 | 8 | 8 | 8 | 3 | ---- | ---- | ---- | 29 |
| Harrisburg | ---- | ---- | ---- | ---- | 2 | 5 | 8 | 11 | 6 | 5 | ---- | 1 | 38 |
| Hartford | ---- | ---- | ---- | ---- | ---- | 5 | 8 | 9 | 4 | 1 | ---- | ---- | 27 |
| Hatteras | 4 | 1 | 2 | 3 | 8 | 16 | 22 | 24 | 15 | 8 | 6 | 10 | 119 |
| Havre | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | ---- | ---- | ---- | ---- | 2 |
| Helena | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | 1 |
| Honolulu | 4 | 5 | 7 | 2 | 4 | 1 | ---- | 1 | 4 | 9 | 3 | 10 | 50 |
| Huron | ---- | ---- | ---- | ---- | 3 | 10 | 9 | 3 | ---- | 1 | ---- | ---- | 26 |
| Indianapolis | ---- | ---- | ---- | 2 | 1 | 6 | 17 | 10 | 6 | ---- | ---- | ---- | 42 |
| Jacksonville | 1 | 2 | 3 | 5 | 15 | 31 | 39 | 26 | 20 | 8 | 2 | 2 | 154 |
| Kalispell | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | 1 |
| Kansas City | ---- | ---- | 1 | 1 | 10 | 17 | 9 | 12 | 13 | 4 | 1 | ---- | 68 |
| Keokuk | ---- | ---- | ---- | ---- | 4 | 17 | 11 | 12 | 10 | 1 | 1 | ---- | 56 |
| Key West | 5 | 3 | 3 | 6 | 19 | 27 | 8 | 17 | 23 | 26 | 3 | 4 | 144 |
| Knoxville | ---- | ---- | ---- | 1 | ---- | 9 | 16 | 13 | 6 | ---- | ---- | ---- | 45 |
| La Crosse | ---- | ---- | ---- | 1 | 3 | 10 | 12 | 15 | 5 | 1 | ---- | ---- | 47 |
| Lander | ---- | ---- | ---- | ---- | ---- | 1 | 1 | ---- | ---- | ---- | ---- | ---- | 2 |
| Lincoln | ---- | ---- | ---- | 1 | 4 | 9 | 11 | 13 | 11 | 1 | ---- | ---- | 50 |
| Little Rock | ---- | 1 | 4 | 12 | 11 | 11 | 12 | 18 | 9 | 5 | 3 | 2 | 88 |
| Los Angeles | 1 | 1 | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3 |
| Louisville | ---- | 1 | 2 | 2 | 2 | 7 | 13 | 9 | 6 | ---- | 1 | ---- | 43 |
| Lynchburg* | ---- | ---- | ---- | 1 | 3 | 7 | 15 | 5 | 1 | 2 | ---- | ---- | 34 |
| Macon | 2 | 3 | 8 | 5 | 5 | 16 | 23 | 20 | 8 | 5 | 2 | 1 | 98 |
| Madison | ---- | ---- | ---- | ---- | 4 | 5 | 11 | 10 | 10 | 1 | ---- | ---- | 41 |
| Marquette | ---- | ---- | ---- | ---- | 1 | 5 | 2 | 2 | 3 | ---- | ---- | ---- | 13 |
| Memphis | ---- | 2 | 4 | 6 | 6 | 7 | 8 | 7 | 9 | 4 | 5 | 3 | 61 |
| Meridian | 4 | 7 | 12 | 12 | 16 | 25 | 28 | 22 | 11 | 6 | 5 | 9 | 157 |
| Milwaukee | ---- | ---- | ---- | 1 | 4 | 6 | 6 | 7 | 4 | 2 | ---- | ---- | 30 |
| Minneapolis | ---- | ---- | ---- | ---- | ---- | 13 | 12 | 10 | 4 | 1 | 1 | ---- | 41 |
| Mobile | 8 | 8 | 21 | 27 | 22 | 25 | 47 | 34 | 13 | 18 | 16 | 12 | 251 |
| Modena | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 1 | ---- | ---- | ---- | ---- | 5 |
| Montgomery | 7 | 9 | 16 | 17 | 13 | 16 | 20 | 17 | 16 | 3 | 8 | 5 | 147 |
| Moorhead | ---- | ---- | ---- | ---- | 1 | 8 | 10 | 8 | 1 | ---- | ---- | ---- | 28 |
| Nantucket | ---- | ---- | ---- | ---- | ---- | 2 | 3 | 6 | 3 | 4 | 1 | ---- | 19 |
| Nashville | 4 | 3 | 3 | 5 | 6 | 13 | 12 | 13 | 4 | 2 | ---- | 4 | 69 |
| New Haven | ---- | ---- | ---- | ---- | ---- | 6 | 10 | 10 | 4 | ---- | 1 | ---- | 31 |
| New Orleans | 9 | 8 | 19 | 29 | 29 | 29 | 45 | 36 | 26 | 22 | 9 | 5 | 266 |

[1] None

*Broken record.

TABLE 4.—*Number of occurrences of rainfall of 1.00 inch in 1 hour or more*—Continued

| Station | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New York | ---- | ---- | 1 | ---- | ---- | 6 | 17 | 9 | 4 | 3 | ---- | ---- | 40 |
| Norfolk | ---- | ---- | ---- | 1 | 3 | 12 | 23 | 13 | 10 | 1 | 1 | 3 | 67 |
| Northfield* | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 5 | ---- | ---- | ---- | ---- | 7 |
| North Head | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| North Platte | ---- | ---- | ---- | 2 | 3 | 6 | 7 | 6 | 1 | 1 | ---- | ---- | 26 |
| Oklahoma City | ---- | ---- | 1 | 5 | 16 | 13 | 11 | 9 | 7 | 5 | 4 | ---- | 71 |
| Omaha | ---- | ---- | ---- | 2 | 4 | 14 | 11 | 7 | 5 | ---- | ---- | ---- | 43 |
| Oswego | ---- | ---- | ---- | ---- | 1 | 4 | 2 | ---- | 3 | ---- | ---- | ---- | 10 |
| Palestine | 2 | ---- | 6 | 13 | 16 | 15 | 9 | 9 | 11 | 6 | 7 | 7 | 101 |
| Parkersburg | ---- | ---- | ---- | 1 | 1 | 7 | 11 | 12 | 6 | ---- | ---- | ---- | 38 |
| Pensacola | 6 | 6 | 12 | 27 | 15 | 12 | 38 | 38 | 20 | 19 | 12 | 11 | 216 |
| Peoria | ---- | ---- | 1 | 2 | 9 | 12 | 13 | 12 | 13 | 1 | 1 | ---- | 64 |
| Philadelphia | ---- | 1 | 2 | 5 | 6 | 13 | 11 | 8 | ---- | ---- | ---- | ---- | 46 |
| Phoenix | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 1 | 2 | ---- | ---- | ---- | 6 |
| Pittsburg | ---- | ---- | ---- | ---- | ---- | 6 | 15 | 6 | 5 | ---- | ---- | ---- | 32 |
| Pocatello | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 2 | ---- | ---- | ---- | ---- | 3 |
| Portland, Maine | ---- | ---- | ---- | ---- | ---- | 1 | 2 | 4 | 3 | ---- | 1 | ---- | 11 |
| Portland, Oreg | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| Providence | ---- | ---- | ---- | ---- | 1 | 3 | 8 | 3 | 6 | 1 | ---- | ---- | 22 |
| Pueblo | ---- | ---- | ---- | ---- | 2 | 4 | 7 | 2 | 1 | ---- | ---- | ---- | 16 |
| Raleigh | ---- | ---- | 2 | 5 | 5 | 17 | 27 | 30 | 13 | 4 | 1 | ---- | 104 |
| Rapid City | ---- | ---- | ---- | ---- | 3 | 1 | 4 | 5 | 2 | ---- | ---- | ---- | 15 |
| Reno [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Richmond | ---- | ---- | ---- | 2 | 4 | 13 | 19 | 17 | 7 | 2 | ---- | ---- | 64 |
| Rochester | ---- | ---- | ---- | ---- | ---- | 2 | 3 | 4 | 2 | ---- | ---- | ---- | 11 |
| Roseburg | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| Roswell | ---- | ---- | ---- | 4 | 3 | 4 | 2 | 4 | 2 | 1 | ---- | ---- | 20 |
| Sacramento | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| St. Louis | ---- | ---- | 1 | 5 | 3 | 6 | 13 | 14 | 12 | 1 | ---- | ---- | 55 |
| Salt Lake City | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | 1 |
| San Antonio | 1 | ---- | 4 | 14 | 19 | 14 | 6 | 7 | 8 | 8 | 1 | 1 | 83 |
| San Diego | ---- | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| Sandusky | ---- | ---- | ---- | 1 | 2 | 6 | 5 | 7 | 6 | 1 | ---- | ---- | 28 |
| San Francisco | ---- | ---- | 1 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 |
| San Jose [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| San Juan | 7 | 4 | 4 | 12 | 18 | 18 | 11 | 6 | 20 | 15 | 22 | 8 | 145 |
| Santa Fe | ---- | ---- | ---- | ---- | ---- | 1 | ---- | 1 | 2 | ---- | ---- | ---- | 4 |
| Sault Ste. Marie | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 3 | 2 | ---- | ---- | ---- | 8 |
| Savannah | 1 | 1 | 1 | 3 | 11 | 16 | 33 | 36 | 30 | 6 | 2 | ---- | 140 |
| Scranton | ---- | 1 | ---- | ---- | ---- | 11 | 13 | 9 | 3 | ---- | ---- | ---- | 37 |
| Seattle [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sheridan | ---- | ---- | ---- | ---- | 1 | 2 | 1 | 1 | ---- | ---- | ---- | ---- | 5 |
| Shreveport | 2 | 1 | 8 | 11 | 16 | 9 | 18 | 8 | 12 | 11 | 7 | 5 | 108 |
| Sioux City | ---- | ---- | ---- | ---- | 3 | 13 | 11 | 7 | 10 | ---- | ---- | ---- | 44 |
| Spokane [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Springfield, Ill. | ---- | ---- | 2 | 1 | 4 | 15 | 10 | 8 | 9 | 1 | 1 | ---- | 51 |
| Springfield, Mo. | ---- | ---- | 2 | 2 | 2 | 16 | 9 | 14 | 5 | 2 | ---- | ---- | 52 |
| Syracuse | ---- | ---- | ---- | ---- | 1 | 7 | 10 | 6 | 1 | ---- | ---- | ---- | 25 |
| Tampa | 6 | 5 | 7 | 9 | 20 | 39 | 30 | 49 | 25 | 8 | 2 | 1 | 201 |
| Tatoosh Island | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 1 | 1 | ---- | 2 |
| Toledo | ---- | ---- | ---- | 1 | 1 | 5 | 4 | 9 | 7 | ---- | 1 | ---- | 28 |
| Topeka | ---- | ---- | 3 | 5 | 11 | 13 | 16 | 13 | 14 | 4 | 1 | ---- | 80 |
| Valentine | ---- | ---- | ---- | 3 | 1 | 7 | 6 | 1 | ---- | ---- | ---- | ---- | 18 |
| Vicksburg | 5 | 6 | 14 | 18 | 18 | 14 | 17 | 13 | 9 | 6 | 3 | 11 | 138 |
| Walla Walla [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Washington, D. C. | ---- | ---- | ---- | ---- | 3 | 11 | 18 | 17 | 14 | 3 | ---- | ---- | 66 |
| Wichita | ---- | ---- | ---- | 4 | 7 | 20 | 11 | 9 | 5 | 4 | 2 | ---- | 62 |
| Williston | ---- | ---- | ---- | ---- | ---- | 12 | 4 | 4 | ---- | ---- | ---- | ---- | 20 |
| Wilmington | 3 | 1 | 1 | 2 | 5 | 14 | 33 | 30 | 19 | 4 | 2 | 1 | 115 |
| Winnemucca [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Wytheville | ---- | ---- | ---- | ---- | 2 | 8 | 9 | 10 | 4 | ---- | 1 | ---- | 34 |
| Yellowstone Park [1] | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Yuma | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 2 | ---- | 1 | ---- | ---- | 5 |

[1] None.

*Broken record.

# COMPARISON OF EXTREME GUST VELOCITIES AS RECORDED BY THE DINES ANEMOMETER AND 5-MINUTE VELOCITIES AS RECORDED BY THE ROBINSON ANEMOMETER

By H. D. DYCK

[Weather Bureau, Washington, D. C., May 1941]

The Weather Bureau records the highest wind velocities for each day in two ways: (1) by the greatest number of miles recorded in a fixed period of time, 5 minutes, called the *maximum velocity;* (2) by the mile recorded in the shortest period of time, called the *extreme velocity.* In a previous study of wind velocities as recorded by the Dines and the Robinson anemometers,[1] extreme gusts and average velocities by the Dines anemometer were compared with the extreme velocity or fastest mile recorded by the Robinson anemometer. The present study, intended as a supplement to the former, compares 5-minute velocities recorded by the Robinson anemometer with extreme gust velocities recorded by the Dines.

The wind records for 1939 at Washington, D. C., with the exception of a few of the higher velocities used in extending the graph, were used in this comparison. Data were used only when the wind was of fairly constant structure. Due to the proximity of an effective barrier about 200 feet south of the exposed instruments, the data used here are taken almost exclusively from periods when the wind was northwest. Also, practically no records were used for the months May to October, since high velocities during these months usually occurred during thunderstorms when the wind rose to a high velocity

[1] Mattice, W. A. A comparison between wind velocities as recorded by the Dines and Robinson anemometers. MO. WEA. REV., August 1938, 66: 238-240

within a very few minutes and diminished again as rapidly. Comparisons of these instances showed a very erratic distribution, the position of the points varying with the length of time required for the wind to reach the extreme gust and decline again. Since the greatest interest is in higher gust velocities, few measurements were taken of velocities less than 25 miles per hour as

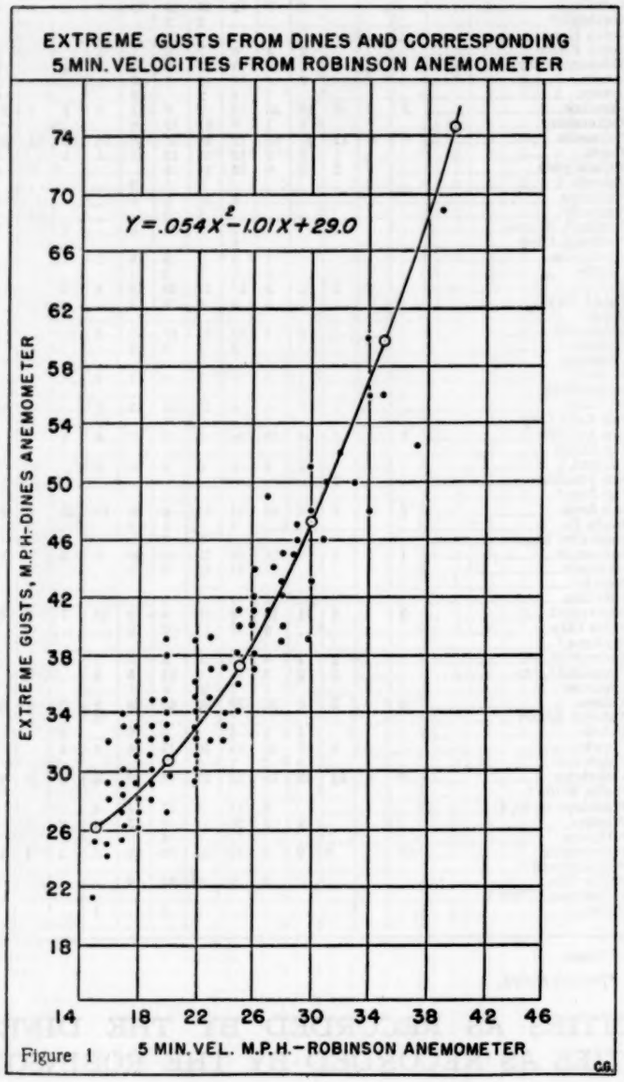


Figure 1

recorded by the Dines instrument. All velocities were corrected to true velocities.

Upon examination of the Dines anemometer record, it may be seen that variations of wave-like nature appear, even though the wind structure is fairly uniform. These fluctuations or waves are never of regular length and there are countless smaller fluctuations superposed on the larger ones. Usually, however, during a period of several hours, two or three pronounced points of maxima occur and at or near these points the "extreme gust" will be found. Such "extreme gusts" were chosen as the subjects for comparison in the first part of this study. Frequently several such gusts were taken from the same day's record; in only four instances, however, was more than one observation taken from an hour's record. For the corresponding 5-minute velocity from the Robinson record, that one was taken which included in it the time of occurrence of the "extreme gust" and at the same time gave the highest possible 5-minute velocity. Attention is drawn here to the fact that the 5-minute periods which included the time of the "extreme gusts" did not necessarily include the maximum or highest 5-minute velocity for the day. The corresponding velocities obtained as explained are shown in figure 1. The equation of the line which seemed to fit the greater part of the data is an approximation only, obtained by fitting a parabola to points taken on a curve which had been sketched. It is not applicable beyond the limits of the graph.

In about half of the days studied the maximum or highest 5-minute velocity for the day coincided with the extreme gust for the day, and in 85 percent of the days studied the maximum velocity occurred within an hour

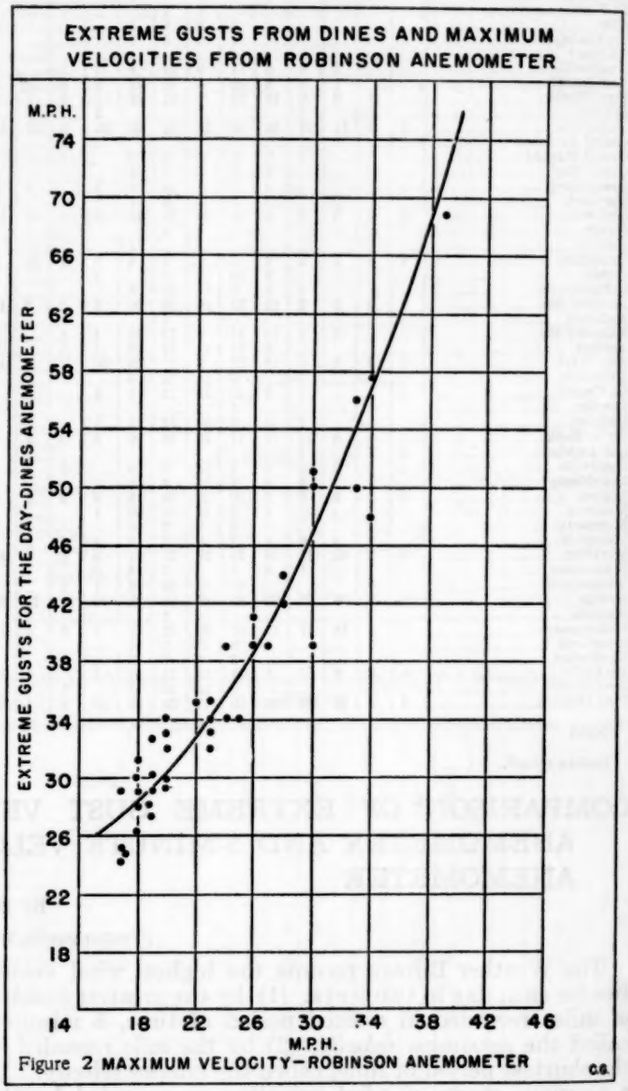


Figure 2 MAXIMUM VELOCITY—ROBINSON ANEMOMETER

of the extreme gust. It seemed likely, therefore that some relation existed between these two velocities. Accordingly, corresponding velocities were noted from this 85 percent and results plotted in figure 2. The curve from figure 1 was superimposed.

Since the results are approximations, no further analysis was attempted.

# HURRICANE OF OCTOBER 3–12 AND TROPICAL DISTURBANCE OF OCTOBER 18–21, 1941

By HOWARD C. SUMNER

[Weather Bureau, Washington, November 1941]

*Hurricane of October 3–12, 1941.*—The first indications of this storm were observed over the Atlantic about 300 miles north of the Virgin Islands on the evening of October 3. Morning observations of the 4th showed a definite circulation and established the center near latitude 23° N., longitude 67° W. Moving in a west-northwesterly direction, the storm crossed the Bahama Islands and passed a short distance south of Nassau on the evening of October 5, at which time it was determined to be a small but highly developed storm of hurricane force.

Hon. John H. E. McAndrews, American vice consul at Nassau, made the following report of storm conditions on New Providence Island:

> The storm which broke about 7:35 p. m. Sunday evening centered south of Nassau. The velocity of wind registered 102 miles per hour, averaging between 70–75 miles per hour. The barometer reached 29.12 inches (986.1 millibars).
>
> The consulate was kept in touch with the weather forecast by cables sent out by the Jacksonville, Fla., Weather Bureau, and I notified all Americans by personal calls and telephone.
>
> From present records there were no casualties and the only serious reported loss is one made by Henry Von Berge whose schooner *Goodwill II* was sunk during the storm. Considerable damage was done to property and all gardens were more or less devastated.

The wind velocity of 102 miles per hour, reported by Mr. McAndrews and registered by a Dines gust recorder, was the highest recorded on the islands during the passage of this storm. The lowest barometer 964.4 millibars (28.48 inches) was registered at The Bight, Cat Island. In addition to the islands of New Providence and Cat, damage resulted on Watling, Exuma, northern Andros, and islands of the Bimini group.

Observations from these islands, relayed through the Director of Telecommunication, Nassau, were invaluable in enabling the forecasters at the Jacksonville office to issue frequent and accurate warnings as the storm approached the southeast Florida coast.

Storm conditions in the Miami area are summarized in the following extracts from the report of Ernest Carson, official in charge at the Miami office:

> On October 6, 1941, a small tropical storm moving slightly north of west, passed over extreme southern Florida and into the Gulf of Mexico. Its center moved inland about 13 miles south of Miami at 5:30 a. m.; and at 5:45 a. m., Goulds, Fla., a short distance inland, was in the calm area. * * *
>
> The lowest barometer reading in Miami was 994.9 millibars (29.38 inches) at 5 a. m. on the 6th; and 991.5 millibars (29.28 inches) at Fowey Rock Lighthouse, located 12 miles east-southeast of Miami, at 4:30 a. m. The wind reached a velocity of 68 miles per hour (fastest mile on triple register) at 4:47 a. m. Velocities somewhat higher, no doubt, occurred during the next hour; however, due to interference of a taller building to the east of the station, these were not indicated on the register. At Pan American Dinner Key a peak velocity of 123 miles per hour was recorded, with a sustained velocity of 90 miles per hour for 30 seconds.
>
> The most notable feature of this storm was the unusually light rainfall in Nassau and Miami during its approach and passage.

Continuing in a west-northwesterly direction the storm crossed the Everglades south of Lake Okeechobee and passed into the Gulf between Everglades City and Fort Myers about 11 a. m. of the 6th. Along the south shore of the lake, gusts of 60 miles per hour were reported. The lowest pressure, at Everglades City, 995.6 millibars (29.40 inches), was accompanied by winds exceeding 65 miles per hour and a tide of 4.1 feet which flooded the town and surrounding low country to a depth of about 1 foot. Fort Myers was on the northern edge of the storm and suffered little damage from strong winds.

Curving toward the north in the Gulf of Mexico the center moved up the west Florida coast, some distance off shore, causing strong winds at some of the outlying island stations. Edgmont Key at the mouth of Tampa Bay estimated the wind at 60 miles per hour. The disturbance moved inland again at Carrabelle where the calm eye of the storm was experienced between 3:30 and 4:30 a. m. of the 7th. Winds of 65 to 75 miles per hour accompanied the storm at this point, with lowest barometer reported as 982.1 millibars (29.00 inches).

Diminishing somewhat in intensity, but still accompanied by winds with gusts up to 75 miles per hour, the center moved northeastward across Georgia with considerable damage reported along its path as far north as Albany. North of that point little damage was caused by the diminishing winds that attended the storm into South Carolina, where it passed into the Atlantic in the vicinity of Charleston about 8 a. m., October 8.

Although this storm increased somewhat in intensity after moving into the Atlantic, no ship along its later path reported winds higher than force 9. It was traced in a looping course eastward over the ocean until it passed south of Bermuda near latitude 30° N., during the night of October 11–12.

Damage in Florida resulting from this storm has been estimated at $675,000, about equally divided between the northern and southern portions of the State.

Five men were drowned near the small fishing village of Panacea, east of Carrabelle, and these added to three deaths reported from the Bahamas, bring the total of lives lost during this storm to eight. So far as is known seven injuries resulted, none of which could be directly attributed to the storm.

Instrumental in establishing these low figures for loss of life and property damage resulting from this hurricane, were the advisories, warnings, and bulletins, 40 in all,

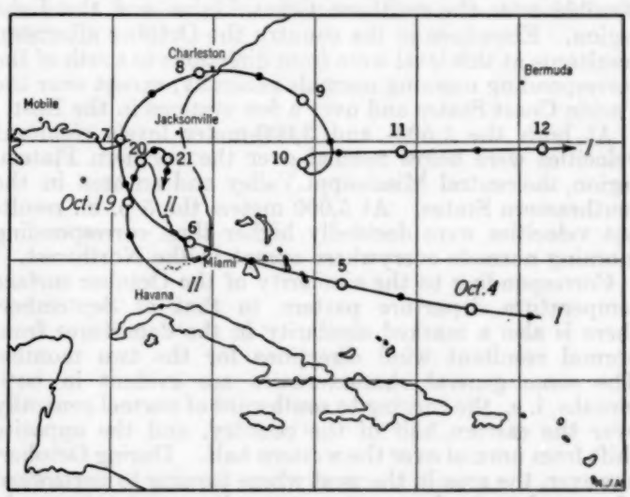



FIGURE 1.—Approximate tracks of tropical storms of October 1941. Open circles on tracks indicate locations of center at 7:30 a. m., E. S. T., of date entered nearby; solid circles indicate locations of center at 7:30 p. m.

issued by the Jacksonville office and promptly distributed by the local offices in cooperation with all communication services.

*Disturbance of October 18–21.*—The first indications of a definite circulation in connection with this slight tropical disturbance were noted about 100 miles off the west Florida coast on the night of October 18–19. It had developed from a wave of low pressure and squally weather that had moved across the southern Bahamas and through the Florida Straits a few days previously, and for which small-craft warnings had been issued on the morning of October 17.

On the morning of October 19, a ship, 50 miles west of Tampa, reported a west-southwest wind of 45 miles per hour and a barometer reading of 1,002.4 millibars (29.60 inches). From this location the storm center then moved north-northwestward and passed inland at Cedar Key, about noon of the 20th, where the lowest barometer reading was 1,005.8 millibars (29.70 inches).

Available observations show no winds over moderate gale force (40 to 50 miles per hour) during the progress of this storm. Torrential rains (10 to 15 inches) occurred at several points near the center as the disturbance stalled and dissipated over northern Florida.

A report from Ocala lists the death of a 6-weeks-old infant, hurled 100 feet from its basket, and injury to both parents when their house was demolished by high winds. This report indicates the formation of a small and short-lived tornado rather than any highly destructive winds resulting directly from the tropical disturbance. All other reported damage resulted from flooding due to the excessive rains.

# METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR OCTOBER 1941

[Climate and Crop Weather Division, J. B. KINCER in charge]

## AEROLOGICAL OBSERVATIONS

By HOMER D. DYCK

Departures from normal surface temperature for October followed nearly the same pattern as in the previous month, temperatures being above normal generally over the eastern half of the country with the exception of an area in the extreme Northeast, and below normal over the western half with the exception of the far Northwest and a narrow strip along the Pacific Coast. Plus departures ranged from 6° to 8° F. over much of the South, while minus departures were small.

At 1,500 meters above sea level the 5 a. m. resultant winds for October were from directions to north of normal over the Lake region and the extreme Northeast and over much of the Plateau region and the far Northwest, while they were from south of normal at this level over much of the rest of the country. At 3,000 meters the morning resultant winds for October were from directions south of normal over most of the country with the exception of three stations near the Pacific coast and one near the Lake region, which had resultant winds to north of normal. At 5,000 meters a good comparison of the 5 p. m. resultant winds with the corresponding 5 a. m. normals was not possible over the northern Great Plains and the Lake region. Elsewhere in the country the October afternoon resultants at this level were from directions to south of the corresponding morning normals generally, except over the Pacific Coast States and over a few stations in the East.

At both the 1,500- and 3,000-meter levels resultant velocities were below normal over the northern Plateau region, the central Mississippi Valley and an area in the southeastern States. At 5,000 meters the 5 p. m. resultant velocities were decidedly higher than corresponding morning normals everywhere except in the Northwest.

Corresponding to the similarity of the October surface temperature departure pattern to that of September, there is also a marked similarity in the departures from normal resultant wind directions for the two months. The same general characteristics are evident in both months, i. e., the turning to southward of normal generally over the eastern half of the country, and the opposite shift from normal over the western half. During October, however, the area in the west where turning to northward of normal took place, was not nearly as extensive as in September thus accounting perhaps for the smaller minus temperature anomalies over that area during October.

When the 5 p. m. resultant directions are compared to the corresponding 5 a. m. resultant directions, no well marked areas of similar wind shift are evident. It may be noted, however, that a shift to southward during the day occurred at considerably more stations than a shift to northward.

At 1,500 meters the 5 p. m. resultant velocities were smaller than the corresponding 5 a. m. velocities over the extreme northern States and over the Middle Atlantic States and the South, while the afternoon velocities were larger than the morning velocities elsewhere generally. At 3,000 meters the p. m. resultant velocities were higher than corresponding a. m. velocities everywhere except over a small area in the southern Plateau region and California where they were slightly below the morning velocities.

The upper-air data discussed above are based on 5 a. m. (E. S. T.) pilot balloon observations (charts VIII and IX) as well as on observations made at 5 p. m. (table 2 and charts X and XI).

Radiosonde and airplane stations located in the southern part of the country recorded on the average the highest mean monthly pressures at each of the several standard levels from 2,000 to 18,000 meters. The highest mean monthly pressure occurred over both Atlanta and Charleston at the 2,000- and 2,500-meter levels, over Atlanta at 3,000 and 4,000 meters, and over Atlanta, Brownsville, and Miami at 5,000 meters. At 6,000 meters Atlanta, Brownsville, Miami, and San Antonio recorded the highest mean monthly pressure while the highest occurred over Brownsville, Lake Charles, Miami, and San Antonio at 7,000 meters, over Brownsville and Miami at 8,000 meters, over Miami and San Antonio at 9,000 meters, and over Brownsville, Miami, and San Antonio at 10,000 meters. At 11,000 meters the highest mean monthly pressure occurred over Miami and San Antonio, while at 12,000 meters pressures averaged highest over Brownsville, Miami, and San Antonio. San Antonio recorded the highest mean monthly pressure from 13,000 to 18,000 meters inclusive. Atlanta also recorded the same maximum, however at 16,000 meters. The lowest mean monthly pressure occurred over both Portland, Maine, and Sault Ste. Marie from 2,000 to 6,000 meters inclusive, while at 7,000 and 8,000 meters the lowest occurred over Portland, Maine, Sault Ste. Marie, Seattle, and Spokane, and at 9,000 meters it occurred at Spokane and Seattle. Spokane recorded the lowest mean monthly pressure at

levels from 10,000 to 16,000 meters inclusive, with Seattle also recording the minimum at the 14,000, 15,000, and 16,000 meter levels. Portland, Maine, also recorded the minimum at 14,000 and 16,000 meters. Pressures averaged lowest over Spokane at 17,000 and 18,000 meters. Mean monthly pressures at Alaskan stations were lower than mean minimum pressures over the United States at corresponding levels from 2,000 to 16,000 meters, inclusive.

Mean surface pressures for October were higher than those for September over most of the United States. At standard levels above the surface, however, only the Northwest recorded higher pressures than last month and these only up to about 7,000 meters, while the rest of the country recorded substantial decreases from last month at all standard levels. These decreases amounted to as much as 9 mb. over Portland, Maine, from about 5,000 to 10,000 meters. All Alaskan stations reported substantial decreases in pressure at all levels. Pressure gradients this month were less steep than last month over the Northwest, but were steeper in general elsewhere over the country. The steepest upper level pressure gradient for October occurred between Sault Ste. Marie and Detroit at the 8,000 meter level where there was a change of 1mb. pressure for each 38 miles of horizontal distance between the two stations.

The mean temperatures for October were considerably lower than September's at most levels up to and including 13,000 meters. Above this level scattered exceptions occurred over the southern Plateau region and the Lake region.

Mean temperatures for October 1941 were considerably higher than those for October 1940 over most of the eastern half of the country up to and including 11,000 meters and somewhat below October 1940 over the western half up to about 7,000 meters. From 7,000 to 19,000 meters, temperatures over the western half were generally above last year's and from 13,000 to 19,000 meters temperatures over the eastern half of the United States were generally lower than last year's.

At 1,000 meters mean temperatures for October were above normal east of the Rocky Mountains with the exception of the central Great Plains and the extreme Northeast where they were slightly below normal. Elsewhere they were below normal at this level. At the 3,000- and 5,000-meter levels mean temperatures were below normal west of the Rocky Mountains and in the extreme Northeast and considerably above normal eslewhere.

The mean relative humidities for the month at the 1,000-, 3,000-, and 5,000-meter levels were considerably above normal over most stations. Marked plus departures occurred over San Antonio, Oklahoma City, and St. Louis at the 1,000- and 3,000-meter levels.

The altitude at which the mean monthly temperature of 0° C. for October occurred varied from the lowest (2,500 meters) over Seattle, Sault Ste. Marie, and Portland, Maine, to the highest (4,900 meters) over Brownsville, Tex. The level at which, on the average, freezing conditions occurred was lower this month than last over all of the United States with the exception of Pensacola, where it was slightly higher. This level was much lower than it was last month over the extreme Northeast, being 1,600 meters lower over Portland, Maine.

The lowest free-air temperature recorded during the month over the United States was −86.3° C. (−123.3° F.). This temperature occurred over Miami, Fla., on the morning of October 6, at an altitude of 16,300 meters (about 10.1 miles) above sea level. The lowest temperature for the month over San Juan was −82.0° C. (−115.6° F.) observed at 17,300 meters (about 10.8 miles) above sea level on October 12.

Table 3 shows the maximum free-air wind velocities for various sections of the United States during October as determined by pilot balloon observations. The highest observed wind velocity for the month was 77 m. p. s. (172 miles per hour) observed over Great Falls, Mont., on October 2. This wind was blowing from the north at an elevation of 10,220 meters (about 6.4 miles) above sea level.

The highest October wind velocity observed during the last 5 years in the free-air layer from the surface to 2,500 meters was 46.8 m. p. s. (105 miles per hour) observed blowing from the south on October 17, 1940, over Rapid City, S. Dak., at an altitude of 1,594 meters (about 1 mile). A velocity of 62.8 m. p. s. (140 miles per hour) is the highest observed in the last 5 years in the layer from 2,500 meters to 5,000 meters. This wind was observed on October 24, 1939, blowing from the northwest at an altitude of 4,240 meters (about 2.6 miles) over Hartford, Conn. During this same 5-year period a still higher wind velocity 78.0 m. p. s. (174 miles per hour) was observed in the layer above 5,000 meters. This wind was blowing from the southwest at an elevation of 7,960 meters (about 14.9 miles) over Denver, Colo., on October 17, 1938.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during October 1941*

| Altitude (meters) m. s. l. | Stations with elevations in meters above sea level | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Albuquerque, N. Mex. (1,620 m.) | | | | Atlanta, Ga. (300 m.) | | | | Bismarck, N. Dak. (505 m.) | | | | Boise, Idaho (864 m.) | | | | Brownsville, Tex. (6 m.) | | | | Buffalo, N. Y. (221 m.) | | | | Charleston, S. C. (14 m.) | | | |
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 30 | 838 | 13.2 | 57 | 31 | 986 | 19.0 | 73 | 31 | 957 | 6.0 | 77 | 31 | 917 | 9.3 | 69 | 31 | 1,014 | 24.7 | 91 | 31 | 992 | 10.3 | 78 | 31 | 1,019 | 19.3 | 90 |
| 500 | | | | | 31 | 963 | 19.8 | 63 | | | | | | | | | 31 | 958 | 23.4 | 87 | 31 | 960 | 10.3 | 75 | 31 | 963 | 20.0 | 76 |
| 1,000 | | | | | 31 | 909 | 18.0 | 67 | 31 | 901 | 8.2 | 65 | 30 | 902 | 11.5 | 66 | 31 | 905 | 20.6 | 80 | 31 | 903 | 8.5 | 70 | 31 | 909 | 17.3 | 71 |
| 1,500 | | | | | 31 | 857 | 15.7 | 64 | 31 | 848 | 5.7 | 63 | 30 | 850 | 9.4 | 62 | 31 | 854 | 18.4 | 71 | 31 | 850 | 6.4 | 69 | 31 | 857 | 14.8 | 65 |
| 2,000 | 30 | 801 | 12.6 | 54 | 31 | 808 | 13.5 | 56 | 31 | 797 | 3.2 | 61 | 30 | 800 | 6.1 | 61 | 31 | 806 | 15.9 | 66 | 31 | 800 | 4.6 | 63 | 31 | 808 | 13.1 | 55 |
| 2,500 | 30 | 754 | 9.5 | 55 | 31 | 761 | 11.0 | 50 | 31 | 749 | 1.4 | 57 | 29 | 752 | 2.6 | 61 | 31 | 759 | 13.7 | 59 | 31 | 752 | 2.6 | 59 | 31 | 761 | 10.9 | 47 |
| 3,000 | 30 | 710 | 5.8 | 58 | 31 | 717 | 8.6 | 42 | 31 | 704 | −1.2 | 55 | 29 | 707 | −0.7 | 61 | 31 | 715 | 10.9 | 56 | 31 | 707 | 0.7 | 54 | 31 | 716 | 8.6 | 42 |
| 4,000 | 30 | 628 | −1.1 | 60 | 31 | 635 | 3.9 | 34 | 31 | 620 | −6.0 | 51 | 28 | 623 | −7.1 | 61 | 31 | 634 | 5.0 | 55 | 30 | 623 | −3.9 | 50 | 30 | 634 | 4.0 | 35 |
| 5,000 | 30 | 553 | −6.8 | 49 | 31 | 561 | −1.9 | 31 | 31 | 546 | −12.4 | 50 | 28 | 547 | −13.4 | 59 | 31 | 561 | −0.7 | 53 | 30 | 549 | −9.5 | 47 | 30 | 560 | −1.7 | 31 |
| 6,000 | 30 | 486 | −12.6 | 39 | 31 | 494 | −7.8 | 28 | 31 | 478 | −19.2 | 49 | 28 | 479 | −20.3 | 55 | 30 | 494 | −7.0 | 50 | 30 | 481 | −15.7 | 45 | 29 | 493 | −8.3 | 29 |
| 7,000 | 30 | 426 | −19.3 | 36 | 31 | 433 | −14.2 | 29 | 31 | 417 | −26.5 | 48 | 28 | 418 | −27.5 | 54 | 29 | 434 | −13.9 | 46 | 30 | 421 | −22.6 | 43 | 29 | 433 | −15.3 | 29 |
| 8,000 | 29 | 372 | −26.4 | 37 | 30 | 379 | −20.8 | 29 | 31 | 362 | −33.8 | 47 | 28 | 363 | −34.7 | 53 | 29 | 380 | −20.7 | 43 | 28 | 367 | −29.5 | 43 | 29 | 379 | −22.4 | 28 |
| 9,000 | 29 | 322 | −33.6 | 37 | 30 | 330 | −28.0 | 29 | 31 | 313 | −41.0 | ---- | 28 | 314 | −42.0 | ---- | 29 | 330 | −28.1 | 41 | 26 | 318 | −36.5 | 42 | 29 | 329 | −29.8 | 28 |
| 10,000 | 29 | 280 | −40.6 | ---- | 29 | 287 | −35.5 | 28 | 31 | 270 | −47.1 | ---- | 28 | 270 | −48.5 | ---- | 29 | 288 | −35.8 | 40 | 24 | 275 | −43.0 | ---- | 29 | 286 | −37.5 | 28 |
| 11,000 | 29 | 241 | −47.0 | ---- | 29 | 248 | −43.2 | ---- | 29 | 232 | −51.8 | ---- | 28 | 232 | −52.5 | ---- | 26 | 248 | −44.0 | ---- | 24 | 237 | −48.8 | ---- | 29 | 246 | −45.5 | ---- |
| 12,000 | 27 | 206 | −52.5 | ---- | 29 | 213 | −50.8 | ---- | 29 | 199 | −54.1 | ---- | 28 | 199 | −55.2 | ---- | 25 | 214 | −51.9 | ---- | 24 | 203 | −54.0 | ---- | 29 | 211 | −53.3 | ---- |
| 13,000 | 26 | 177 | −56.9 | ---- | 29 | 182 | −57.8 | ---- | 29 | 170 | −54.8 | ---- | 27 | 170 | −56.9 | ---- | 25 | 183 | −59.5 | ---- | 23 | 173 | −57.7 | ---- | 29 | 180 | −60.9 | ---- |
| 14,000 | 26 | 151 | −60.8 | ---- | 29 | 155 | −63.9 | ---- | 29 | 145 | −56.2 | ---- | 25 | 145 | −57.9 | ---- | 24 | 155 | −66.7 | ---- | 21 | 147 | −60.1 | ---- | 29 | 153 | −67.2 | ---- |
| 15,000 | 24 | 128 | −64.1 | ---- | 29 | 132 | −68.7 | ---- | 28 | 124 | −57.2 | ---- | 24 | 124 | −59.3 | ---- | 24 | 131 | −72.4 | ---- | 20 | 126 | −61.9 | ---- | 29 | 129 | −72.4 | ---- |
| 16,000 | 23 | 109 | −66.1 | ---- | 29 | 112 | −71.6 | ---- | 26 | 106 | −58.0 | ---- | 19 | 105 | −59.9 | ---- | 20 | 110 | −76.0 | ---- | 18 | 107 | −62.8 | ---- | 27 | 109 | −75.1 | ---- |
| 17,000 | 20 | 92 | −66.2 | ---- | 28 | 94 | −72.3 | ---- | 18 | 90 | −58.2 | ---- | 13 | 90 | −59.7 | ---- | 16 | 93 | −75.8 | ---- | 18 | 91 | −62.0 | ---- | 25 | 92 | −75.1 | ---- |
| 18,000 | 19 | 78 | −64.4 | ---- | 26 | 79 | −70.1 | ---- | 11 | 77 | −58.5 | ---- | 8 | 76 | −59.7 | ---- | 11 | 78 | −71.6 | ---- | 13 | 77 | −61.2 | ---- | 21 | 77 | −71.1 | ---- |
| 19,000 | 10 | 66 | −63.1 | ---- | 21 | 67 | −66.7 | ---- | 5 | 66 | −56.9 | ---- | ---- | ---- | ---- | ---- | 6 | 66 | −68.6 | ---- | 8 | 66 | −60.7 | ---- | 17 | 65 | −66.5 | ---- |
| 20,000 | ---- | ---- | ---- | ---- | 8 | 57 | −62.6 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 6 | 55 | −63.7 | ---- |

| Altitude (meters) m. s. l. | Stations with elevations in meters above sea level | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Denver, Colo. (1,616 m.) | | | | Detroit, Mich. (194 m.) | | | | El Paso, Tex. (1,193 m.) | | | | Ely, Nev. (1,908 m.) | | | | Great Falls, Mont. (1,128 m.) | | | | Huntington, W. Va. (172 m.) | | | | Joliet, Ill. (178 m.) | | | |
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 30 | 839 | 7.8 | 74 | 31 | 994 | 10.4 | 86 | 31 | 882 | 16.6 | 61 | 31 | 809 | 3.7 | 70 | 31 | 888 | 7.2 | 57 | 31 | 999 | 13.8 | 88 | 28 | 997 | 11.4 | 87 |
| 500 | | | | | 31 | 958 | 11.6 | 78 | | | | | | | | | | | | | 31 | 961 | 15.3 | 72 | 28 | 959 | 12.1 | 78 |
| 1,000 | | | | | 31 | 903 | 9.6 | 75 | | | | | | | | | | | | | 31 | 906 | 13.4 | 71 | 28 | 904 | 9.8 | 75 |
| 1,500 | | | | | 31 | 850 | 8.6 | 67 | 31 | 851 | 17.1 | 54 | | | | | 31 | 848 | 7.7 | 55 | 31 | 854 | 11.2 | 66 | 28 | 851 | 8.0 | 72 |
| 2,000 | 30 | 801 | 8.1 | 64 | 31 | 800 | 7.1 | 61 | 31 | 802 | 14.1 | 53 | 31 | 800 | 5.6 | 64 | 31 | 798 | 4.8 | 54 | 31 | 804 | 9.5 | 57 | 28 | 800 | 6.7 | 65 |
| 2,500 | 30 | 753 | 5.3 | 63 | 31 | 752 | 5.0 | 55 | 31 | 756 | 10.9 | 55 | 31 | 752 | 4.1 | 60 | 31 | 750 | 1.8 | 52 | 31 | 757 | 7.3 | 55 | 28 | 753 | 4.9 | 61 |
| 3,000 | 30 | 708 | 2.4 | 64 | 31 | 707 | 2.9 | 52 | 31 | 711 | 7.4 | 57 | 31 | 707 | .7 | 59 | 31 | 705 | −1.0 | 51 | 31 | 712 | 4.8 | 52 | 27 | 708 | 2.9 | 57 |
| 4,000 | 30 | 625 | −3.4 | 63 | 30 | 625 | −1.9 | 49 | 29 | 630 | 1.2 | 56 | 31 | 624 | −5.4 | 58 | 31 | 621 | −6.6 | 51 | 31 | 629 | −.5 | 49 | 27 | 625 | −2.1 | 53 |
| 5,000 | 29 | 550 | −9.6 | 59 | 30 | 550 | −8.0 | 46 | 29 | 556 | −4.5 | 50 | 31 | 548 | −11.8 | 56 | 31 | 546 | −12.9 | 50 | 30 | 555 | −6.0 | 44 | 27 | 551 | −7.8 | 48 |
| 6,000 | 28 | 483 | −16.3 | 56 | 28 | 483 | −14.0 | 43 | 29 | 489 | −10.8 | 41 | 31 | 480 | −18.7 | 52 | 31 | 478 | −19.5 | 47 | 30 | 487 | −12.3 | 42 | 27 | 484 | −14.3 | 46 |
| 7,000 | 27 | 422 | −23.2 | 52 | 27 | 423 | −20.8 | 42 | 28 | 428 | −17.6 | 40 | 31 | 420 | −25.5 | 50 | 31 | 417 | −26.8 | 45 | 30 | 427 | −19.0 | 41 | 27 | 423 | −21.0 | 44 |
| 8,000 | 26 | 367 | −30.2 | 49 | 27 | 369 | −27.7 | 41 | 27 | 374 | −24.5 | 38 | 31 | 364 | −33.0 | 49 | 31 | 362 | −34.3 | 45 | 30 | 373 | −25.7 | 40 | 26 | 369 | −27.7 | 42 |
| 9,000 | 24 | 318 | −37.5 | ---- | 27 | 320 | −35.0 | 39 | 27 | 325 | −31.8 | 38 | 30 | 315 | −40.2 | ---- | 31 | 313 | −41.5 | ---- | 30 | 324 | −32.9 | 41 | 24 | 320 | −34.8 | 43 |
| 10,000 | 21 | 275 | −44.6 | ---- | 25 | 277 | −41.9 | ---- | 27 | 282 | −39.1 | 37 | 30 | 272 | −46.1 | ---- | 31 | 270 | −47.6 | ---- | 30 | 280 | −40.4 | ---- | 21 | 277 | −41.8 | ---- |
| 11,000 | 18 | 236 | −50.4 | ---- | 25 | 238 | −48.3 | ---- | 27 | 243 | −46.4 | ---- | 30 | 234 | −50.0 | ---- | 30 | 232 | −52.2 | ---- | 30 | 242 | −47.9 | ---- | 17 | 238 | −48.3 | ---- |
| 12,000 | 19 | 202 | −54.1 | ---- | 23 | 205 | −53.9 | ---- | 27 | 209 | −53.2 | ---- | 30 | 200 | −53.2 | ---- | 30 | 198 | −54.9 | ---- | 29 | 207 | −54.6 | ---- | 15 | 204 | −54.7 | ---- |
| 13,000 | 18 | 173 | −56.8 | ---- | 22 | 175 | −57.9 | ---- | 26 | 178 | −59.4 | ---- | 30 | 171 | −55.3 | ---- | 30 | 169 | −56.2 | ---- | 29 | 177 | −59.7 | ---- | 9 | 174 | −60.4 | ---- |
| 14,000 | 17 | 148 | −59.2 | ---- | 22 | 149 | −60.5 | ---- | 26 | 152 | −64.6 | ---- | 29 | 146 | −57.0 | ---- | 30 | 145 | −57.0 | ---- | 29 | 151 | −63.7 | ---- | 8 | 148 | −64.3 | ---- |
| 15,000 | 16 | 125 | −61.2 | ---- | 20 | 127 | −62.4 | ---- | 24 | 129 | −67.9 | ---- | 29 | 125 | −58.8 | ---- | 27 | 123 | −57.4 | ---- | 26 | 128 | −66.8 | ---- | 6 | 126 | −65.2 | ---- |
| 16,000 | 14 | 107 | −62.3 | ---- | 18 | 108 | −63.4 | ---- | 21 | 109 | −69.1 | ---- | 26 | 106 | −60.4 | ---- | 26 | 105 | −58.1 | ---- | 19 | 108 | −68.0 | ---- | ---- | ---- | ---- | ---- |
| 17,000 | 11 | 91 | −62.4 | ---- | 17 | 92 | −63.0 | ---- | 18 | 92 | −68.4 | ---- | 15 | 91 | −61.1 | ---- | 21 | 90 | −58.0 | ---- | 14 | 92 | −67.4 | ---- | ---- | ---- | ---- | ---- |
| 18,000 | 6 | 77 | −62.2 | ---- | 7 | 78 | −60.9 | ---- | 13 | 78 | −65.9 | ---- | ---- | ---- | ---- | ---- | 10 | 76 | −57.1 | ---- | 8 | 77 | −65.1 | ---- | ---- | ---- | ---- | ---- |
| 19,000 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 6 | 66 | −63.8 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during October 1941*—Continued

Stations with elevations in meters above sea level

| Altitude (members) m. s. l. | Lake Charles, La. (5 m.) | | | | Lakehurst, N. J.[1] (39 m.) | | | | Medford, Oreg. (401 m.) | | | | Miami, Fla. (4 m.) | | | | Nashville, Tenn. (180 m.) | | | | Norfolk, Va.[1 2] (10 m.) | | | | Oakland, Calif. (2 m.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 30 | 1,016 | 21.6 | 92 | 32 | 1,014 | 12.0 | 83 | 31 | 970 | 11.2 | 73 | 31 | 1,017 | 24.4 | 87 | 31 | 998 | 18.4 | 73 | 22 | 1,022 | 18.2 | 81 | 31 | 1,015 | 14.6 | 76 |
| 500 | 30 | 960 | 21.5 | 83 | 32 | 960 | 12.4 | 84 | 31 | 958 | 12.2 | 70 | 31 | 961 | 22.5 | 89 | 31 | 962 | 19.1 | 66 | 22 | 964 | 18.3 | 68 | 31 | 957 | 15.4 | 58 |
| 1,000 | 30 | 906 | 19.3 | 78 | 32 | 905 | 10.2 | 78 | 31 | 903 | 11.4 | 66 | 31 | 907 | 19.2 | 83 | 31 | 907 | 16.6 | 69 | 22 | 909 | 16.0 | 64 | 31 | 902 | 13.7 | 51 |
| 1,500 | 30 | 855 | 17.0 | 74 | 32 | 852 | 8.8 | 69 | 31 | 850 | 8.5 | 69 | 31 | 856 | 16.5 | 79 | 31 | 855 | 14.6 | 66 | 22 | 857 | 13.5 | 62 | 31 | 850 | 11.0 | 49 |
| 2,000 | 30 | 806 | 14.5 | 69 | 32 | 802 | 7.2 | 61 | 31 | 800 | 5.7 | 69 | 31 | 807 | 13.8 | 76 | 31 | 806 | 12.4 | 62 | 22 | 807 | 11.5 | 57 | 31 | 800 | 8.4 | 46 |
| 2,500 | 30 | 760 | 12.2 | 65 | 32 | 754 | 5.5 | 56 | 31 | 752 | 3.1 | 64 | 31 | 760 | 11.9 | 64 | 31 | 759 | 9.9 | 59 | 22 | 760 | 9.7 | 52 | 31 | 753 | 6.1 | 40 |
| 3,000 | 30 | 716 | 10.1 | 56 | 32 | 709 | 3.4 | 56 | 31 | 707 | 0.4 | 59 | 31 | 716 | 9.5 | 56 | 31 | 715 | 7.4 | 59 | 21 | 715 | 7.1 | 46 | 31 | 708 | 3.4 | 36 |
| 4,000 | 30 | 634 | 4.5 | 51 | 31 | 626 | −1.7 | 56 | 31 | 624 | −4.7 | 46 | 31 | 634 | 4.5 | 45 | 30 | 632 | 2.1 | 54 | 21 | 632 | 1.8 | 38 | 31 | 625 | −2.4 | 33 |
| 5,000 | 30 | 560 | −1.3 | 48 | 31 | 552 | −7.4 | 53 | 31 | 549 | −10.8 | 44 | 30 | 561 | −0.6 | 38 | 29 | 558 | −3.2 | 46 | 18 | 558 | −5.8 | 33 | 31 | 551 | −8.7 | 30 |
| 6,000 | 29 | 493 | −7.1 | 42 | 30 | 484 | −13.6 | 57 | 31 | 481 | −17.5 | 43 | 30 | 494 | −6.5 | 33 | 29 | 491 | −9.5 | 44 | | | | | 29 | 483 | −15.8 | 32 |
| 7,000 | 29 | 434 | −13.7 | 42 | 30 | 424 | −20.2 | 61 | 31 | 420 | −24.8 | 43 | 30 | 434 | −13.1 | 31 | 28 | 431 | −16.3 | 42 | | | | | 29 | 422 | −22.8 | 32 |
| 8,000 | 29 | 379 | −20.7 | 40 | 29 | 370 | −27.0 | 62 | 31 | 365 | −32.1 | 42 | 30 | 380 | −20.2 | 30 | 28 | 376 | −23.2 | 39 | | | | | 29 | 367 | −29.6 | 31 |
| 9,000 | 29 | 330 | −28.0 | 39 | 27 | 321 | −34.1 | 60 | 31 | 316 | −39.3 | 39 | 30 | 331 | −27.7 | 30 | 26 | 327 | −30.4 | 36 | | | | | 28 | 318 | −36.3 | 30 |
| 10,000 | 29 | 287 | −35.4 | 38 | 26 | 278 | −41.1 | | 31 | 273 | −45.9 | | 29 | 288 | −35.2 | 29 | 24 | 284 | −37.8 | 33 | | | | | 25 | 276 | −42.3 | |
| 11,000 | 28 | 248 | −43.2 | | 24 | 239 | −47.6 | | 30 | 234 | −51.1 | | 29 | 249 | −42.9 | | 22 | 245 | −45.3 | | | | | | 23 | 237 | −47.4 | |
| 12,000 | 28 | 213 | −50.9 | | 22 | 205 | −53.3 | | 30 | 200 | −54.9 | | 29 | 214 | −50.6 | | 22 | 211 | −52.4 | | | | | | 21 | 204 | −51.8 | |
| 13,000 | 28 | 183 | −58.1 | | 22 | 176 | −57.8 | | 30 | 171 | −57.7 | | 29 | 183 | −58.3 | | 21 | 180 | −58.7 | | | | | | 18 | 174 | −55.1 | |
| 14,000 | 27 | 155 | −64.6 | | 19 | 150 | −60.8 | | 30 | 146 | −59.1 | | 29 | 156 | −65.7 | | 21 | 153 | −63.8 | | | | | | 17 | 149 | −57.7 | |
| 15,000 | 25 | 132 | −69.6 | | 18 | 128 | −62.4 | | 29 | 124 | −60.1 | | 29 | 132 | −71.7 | | 19 | 130 | −67.3 | | | | | | 17 | 127 | −59.6 | |
| 16,000 | 21 | 111 | −73.4 | | 18 | 109 | −63.4 | | 22 | 106 | −60.6 | | 28 | 111 | −75.5 | | 17 | 110 | −69.2 | | | | | | 15 | 108 | −60.8 | |
| 17,000 | 19 | 93 | −74.9 | | 16 | 93 | −63.5 | | 12 | 90 | −60.7 | | 25 | 94 | −75.6 | | 14 | 93 | −68.5 | | | | | | 9 | 92 | −59.8 | |
| 18,000 | 13 | 78 | −73.9 | | 10 | 79 | −62.4 | | 6 | 77 | −59.0 | | 22 | 78 | −72.2 | | 10 | 78 | −66.7 | | | | | | 5 | 78 | −59.4 | |
| 19,000 | 5 | 66 | −70.9 | | 5 | 68 | −60.8 | | | | | | 14 | 66 | −67.5 | | 6 | 67 | −64.1 | | | | | | | | | |

Stations with elevations in meters above sea level

| Altitude (meters) m. s. l. | Oklahoma City, Okla. (391 m.) | | | | Omaha, Nebr. (301 m.) | | | | Pensacola, Fla.[1] (24 m.) | | | | Phoenix, Ariz. (339 m.) | | | | Portland, Maine (20 m.) | | | | St. Louis, Mo. (171 m.) | | | | St. Paul, Minn. (225 m.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 31 | 971 | 16.5 | 88 | 31 | 981 | 11.6 | 83 | 23 | 1,015 | 22.7 | 81 | 31 | 972 | 18.0 | 59 | 31 | 1,014 | 6.8 | 80 | 31 | 998 | 15.6 | 81 | 31 | 989 | 9.4 | 81 |
| 500 | 31 | 959 | 17.0 | 83 | 31 | 958 | 12.5 | 75 | 23 | 961 | 21.4 | 75 | 31 | 954 | 21.4 | 42 | 31 | 957 | 7.7 | 71 | 31 | 960 | 16.0 | 72 | 31 | 957 | 9.7 | 73 |
| 1,000 | 31 | 904 | 15.4 | 78 | 31 | 903 | 10.9 | 71 | 23 | 907 | 19.2 | 71 | 31 | 900 | 19.4 | 38 | 31 | 901 | 5.5 | 67 | 31 | 905 | 13.6 | 73 | 31 | 901 | 7.9 | 69 |
| 1,500 | 31 | 853 | 13.9 | 74 | 31 | 850 | 9.7 | 64 | 23 | 856 | 16.3 | 7 | 31 | 849 | 15.8 | 40 | 31 | 847 | 3.4 | 65 | 31 | 853 | 12.2 | 65 | 31 | 848 | 6.5 | 65 |
| 2,000 | 31 | 803 | 12.0 | 67 | 31 | 800 | 8.4 | 60 | 23 | 806 | 13.8 | 64 | 31 | 800 | 12.1 | 44 | 31 | 796 | 1.6 | 59 | 31 | 803 | 10.7 | 60 | 31 | 798 | 4.8 | 58 |
| 2,500 | 31 | 756 | 9.4 | 62 | 31 | 753 | 6.4 | 56 | 23 | 759 | 11.7 | 53 | 31 | 753 | 8.6 | 46 | 30 | 748 | −0.1 | 54 | 31 | 756 | 8.6 | 58 | 31 | 750 | 2.8 | 57 |
| 3,000 | 31 | 712 | 6.5 | 60 | 31 | 708 | 3.9 | 53 | 23 | 715 | 9.5 | 46 | 31 | 709 | 5.9 | 44 | 30 | 702 | −1.6 | 50 | 31 | 712 | 6.0 | 57 | 31 | 705 | 0.9 | 56 |
| 4,000 | 29 | 630 | 1.3 | 53 | 27 | 626 | −1.8 | 48 | 23 | 634 | 4.2 | 39 | 31 | 627 | 0.3 | 37 | 30 | 619 | −6.8 | 46 | 31 | 630 | 0.6 | 53 | 31 | 622 | −4.2 | 53 |
| 5,000 | 27 | 556 | −4.5 | 48 | 27 | 552 | −7.5 | 45 | 22 | 560 | −1.6 | 38 | 31 | 553 | −5.7 | 34 | 30 | 544 | −12.8 | 46 | 30 | 555 | −5.1 | 43 | 31 | 547 | −10.3 | 48 |
| 6,000 | 27 | 489 | −10.5 | 45 | 27 | 484 | −14.0 | 41 | 22 | 493 | −8.0 | 36 | 31 | 486 | −12.3 | 34 | 30 | 476 | −19.2 | 44 | 30 | 488 | −11.3 | 40 | 30 | 480 | −16.7 | 45 |
| 7,000 | 26 | 429 | −16.8 | 41 | 25 | 424 | −20.6 | 38 | 20 | 433 | −14.2 | 36 | 31 | 426 | −19.0 | 34 | 29 | 416 | −25.8 | 44 | 29 | 428 | −17.6 | 40 | 29 | 419 | −23.6 | 44 |
| 8,000 | 25 | 374 | −23.8 | 41 | 24 | 370 | −27.6 | 37 | 12 | 378 | −21.3 | 31 | 30 | 371 | −25.9 | 34 | 29 | 361 | −32.4 | 44 | 28 | 374 | −24.2 | 40 | 29 | 365 | −30.7 | 44 |
| 9,000 | 24 | 326 | −30.5 | 40 | 23 | 321 | −34.3 | 34 | 12 | 329 | −29.1 | | 29 | 322 | −32.8 | 33 | 29 | 313 | −38.9 | 43 | 26 | 325 | −31.3 | 40 | 26 | 316 | −37.7 | 44 |
| 10,000 | 24 | 283 | −37.5 | 39 | 18 | 278 | −41.1 | | 11 | 286 | −36.7 | | 28 | 280 | −39.0 | 32 | 29 | 270 | −45.3 | | 26 | 282 | −38.6 | 39 | 25 | 273 | −44.2 | |
| 11,000 | 24 | 244 | −44.8 | | 16 | 240 | −47.1 | | 8 | 247 | −43.8 | | 26 | 241 | −44.6 | | 29 | 232 | −50.8 | | 25 | 243 | −45.9 | | 25 | 235 | −49.4 | |
| 12,000 | 24 | 210 | −51.7 | | 13 | 206 | −52.4 | | 6 | 212 | −52.0 | | 24 | 207 | −50.0 | | 29 | 199 | −55.7 | | 25 | 208 | −52.5 | | 23 | 201 | −53.9 | |
| 13,000 | 24 | 179 | −57.1 | | 11 | 176 | −56.6 | | | | | | 24 | 177 | −54.6 | | 29 | 170 | −58.8 | | 25 | 178 | −57.7 | | 23 | 172 | −56.2 | |
| 14,000 | 24 | 153 | −62.1 | | 10 | 150 | −59.4 | | | | | | 23 | 151 | −58.7 | | 27 | 144 | −60.4 | | 25 | 151 | −61.4 | | 20 | 146 | −57.8 | |
| 15,000 | 23 | 130 | −66.2 | | 8 | 128 | −61.8 | | | | | | 23 | 129 | −62.3 | | 27 | 123 | −62.5 | | 25 | 129 | −64.3 | | 18 | 125 | −58.8 | |
| 16,000 | 23 | 110 | −68.6 | | 7 | 109 | −63.4 | | | | | | 20 | 109 | −64.5 | | 20 | 104 | −63.0 | | 22 | 109 | −66.7 | | 17 | 106 | −58.8 | |
| 17,000 | 20 | 93 | −69.2 | | 5 | 93 | −63.4 | | | | | | 20 | 92 | −65.3 | | 11 | 89 | −62.4 | | 17 | 92 | −67.0 | | 15 | 91 | −58.5 | |
| 18,000 | 19 | 78 | −67.8 | | | | | | | | | | 14 | 78 | −64.5 | | 5 | 75 | −61.2 | | 13 | 78 | −65.5 | | 13 | 77 | −57.9 | |
| 19,000 | 14 | 66 | −65.1 | | | | | | | | | | 8 | 66 | −62.5 | | | | | | | | | | 8 | 66 | −57.1 | |
| 20,000 | 7 | 56 | −63.0 | | | | | | | | | | 6 | 56 | −59.9 | | | | | | | | | | | | | |

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during October 1941*—Continued

| Altitude (meters) m. s. l. | Stations with elevations in meters above sea level | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | San Antonio, Tex. (174 m.) | | | | San Diego, Calif.[1] (19 m.) | | | | Sault Ste. Marie, Mich. (221 m.) | | | | Seattle, Wash.[1] (27 m.) | | | | Spokane, Wash. (598 m.) | | | | Washington, D. C. (25 m.) | | | |
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 31 | 996 | 21.9 | 90 | 30 | 1,011 | 17.8 | 79 | 31 | 990 | 6.8 | 88 | 31 | 1,015 | 11.6 | 88 | 31 | 947 | 7.4 | 83 | 31 | 1,018 | 16.5 | 69 |
| 500 | 31 | 960 | 21.1 | 85 | 30 | 956 | 16.6 | 71 | 31 | 957 | 6.7 | 83 | 31 | 959 | 10.1 | 90 | | | | | 31 | 963 | 16.1 | 62 |
| 1,000 | 31 | 906 | 19.1 | 79 | 30 | 901 | 14.8 | 63 | 31 | 900 | 4.5 | 80 | 31 | 903 | 7.7 | 88 | 31 | 902 | 8.1 | 73 | 31 | 908 | 13.4 | 62 |
| 1,500 | 31 | 855 | 17.0 | 79 | 30 | 849 | 12.4 | 54 | 31 | 847 | 2.6 | 74 | 31 | 850 | 5.0 | 85 | 31 | 849 | 5.9 | 66 | 31 | 855 | 11.1 | 62 |
| 2,000 | 31 | 806 | 14.4 | 80 | 30 | 800 | 10.0 | 46 | 31 | 796 | 1.7 | 66 | 31 | 799 | 2.6 | 79 | 31 | 798 | 3.5 | 62 | 31 | 805 | 9.5 | 57 |
| 2,500 | 31 | 759 | 12.0 | 74 | 29 | 753 | 8.1 | 42 | 31 | 748 | 0.1 | 59 | 31 | 751 | 0.1 | 74 | 31 | 750 | 0.7 | 62 | 31 | 758 | 7.3 | 55 |
| 3,000 | 31 | 716 | 9.8 | 67 | 29 | 708 | 5.6 | 39 | 31 | 702 | −2.1 | 55 | 31 | 705 | −2.6 | 69 | 31 | 705 | −2.2 | 61 | 31 | 713 | 4.9 | 55 |
| 4,000 | 31 | 634 | 4.8 | 58 | 28 | 626 | 0.0 | 36 | 29 | 619 | −7.0 | 54 | 31 | 621 | −7.8 | 54 | 31 | 621 | −8.1 | 56 | 31 | 630 | 0.0 | 49 |
| 5,000 | 31 | 560 | −0.8 | 53 | 28 | 552 | −6.4 | 40 | 26 | 544 | −12.4 | 51 | 31 | 545 | −14.1 | 52 | 31 | 545 | −14.1 | 49 | 31 | 556 | −5.7 | 48 |
| 6,000 | 31 | 494 | −6.8 | 48 | 27 | 486 | −12.8 | 37 | 26 | 476 | −18.7 | 49 | 31 | 477 | −20.8 | 55 | 31 | 477 | −20.9 | 44 | 30 | 489 | −12.1 | 47 |
| 7,000 | 29 | 434 | −13.1 | 45 | 27 | 425 | −19.8 | 39 | 25 | 416 | −25.7 | 49 | 29 | 416 | −27.7 | 54 | 30 | 416 | −28.4 | 43 | 29 | 428 | −18.7 | 48 |
| 8,000 | 29 | 379 | −19.8 | 44 | 24 | 371 | −26.5 | ..... | 24 | 361 | −32.7 | 49 | 29 | 361 | −34.6 | 49 | 30 | 361 | −36.0 | 41 | 29 | 374 | −25.5 | 47 |
| 9,000 | 29 | 331 | −26.4 | 42 | 23 | 322 | −33.0 | ..... | 23 | 313 | −39.9 | 47 | 29 | 312 | −41.7 | ..... | 30 | 312 | −43.3 | ..... | 28 | 325 | −32.9 | 46 |
| 10,000 | 28 | 288 | −33.8 | 41 | 23 | 278 | −39.7 | ..... | 23 | 270 | −47.1 | ..... | 29 | 269 | −48.5 | ..... | 28 | 268 | −49.3 | ..... | 28 | 282 | −40.4 | ..... |
| 11,000 | 27 | 249 | −41.2 | ..... | 21 | 240 | −45.5 | ..... | 22 | 232 | −52.5 | ..... | 27 | 231 | −53.5 | ..... | 27 | 230 | −53.6 | ..... | 28 | 243 | −47.7 | ..... |
| 12,000 | 27 | 214 | −48.7 | ..... | 19 | 206 | −51.3 | ..... | 21 | 199 | −55.8 | ..... | 27 | 198 | −56.4 | ..... | 27 | 197 | −55.7 | ..... | 27 | 208 | −54.6 | ..... |
| 13,000 | 27 | 184 | −55.9 | ..... | 16 | 177 | −56.0 | ..... | 20 | 170 | −57.7 | ..... | 24 | 169 | −58.2 | ..... | 27 | 168 | −56.7 | ..... | 27 | 178 | −60.5 | ..... |
| 14,000 | 27 | 157 | −62.2 | ..... | 12 | 151 | −59.7 | ..... | 18 | 145 | −58.9 | ..... | 22 | 144 | −58.9 | ..... | 25 | 144 | −57.5 | ..... | 26 | 151 | −64.7 | ..... |
| 15,000 | 27 | 133 | −67.6 | ..... | 10 | 128 | −63.1 | ..... | 15 | 123 | −59.5 | ..... | 21 | 122 | −59.1 | ..... | 24 | 122 | −58.4 | ..... | 25 | 128 | −66.8 | ..... |
| 16,000 | 27 | 112 | −71.1 | ..... | 7 | 109 | −66.5 | ..... | 15 | 105 | −59.4 | ..... | 19 | 104 | −59.2 | ..... | 20 | 104 | −58.2 | ..... | 24 | 109 | −67.7 | ..... |
| 17,000 | 24 | 95 | −71.8 | ..... | ..... | ..... | ..... | ..... | 9 | 89 | −58.4 | ..... | 14 | 88 | −58.9 | ..... | 13 | 89 | −57.9 | ..... | 22 | 92 | −67.3 | ..... |
| 18,000 | 17 | 80 | −69.1 | ..... | ..... | ..... | ..... | ..... | 6 | 76 | −58.0 | ..... | 10 | 74 | −58.9 | ..... | 8 | 76 | −57.0 | ..... | 19 | 78 | −65.7 | ..... |
| 19,000 | 8 | 68 | −64.5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 9 | 66 | −62.9 | ..... |

| Altitude (meters) m. s. l. | Stations with elevations in meters above sea level | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anchorage, Alaska (42 m.) | | | | Atlantic Station No. 1[3] (3 m.) | | | | Atlantic Station No. 2[4] (3 m.) | | | | Bethel, Alaska (7 m.) | | | | Coco Solo, C. Z.[1 3] (15 m.) | | | | Fairbanks, Alaska (156 m.) | | | |
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 31 | 998 | 2.2 | 66 | 28 | 1,017 | 20.4 | 70 | 27 | 1,017 | 18.3 | 78 | 31 | 1,003 | 1.6 | 80 | 19 | 1,012 | 26.4 | 92 | 30 | 988 | −2.8 | 72 |
| 500 | 31 | 943 | 1.3 | 62 | 28 | 960 | 16.2 | 74 | 27 | 960 | 14.0 | 83 | 31 | 944 | 0.2 | 79 | 19 | 958 | 24.9 | 79 | 30 | 946 | −4.5 | 75 |
| 1,000 | 31 | 886 | −0.6 | 60 | 28 | 905 | 12.4 | 80 | 27 | 904 | 10.8 | 83 | 31 | 887 | −2.3 | 79 | 19 | 904 | 22.2 | 78 | 30 | 888 | −6.4 | 77 |
| 1,500 | 31 | 831 | −3.3 | 63 | 28 | 852 | 9.5 | 80 | 27 | 852 | 9.2 | 74 | 31 | 832 | −4.3 | 72 | 19 | 854 | 19.4 | 70 | 30 | 833 | −8.5 | 78 |
| 2,000 | 31 | 780 | −6.3 | 66 | 28 | 802 | 7.6 | 72 | 27 | 802 | 8.0 | 65 | 31 | 781 | −6.8 | 66 | 19 | 804 | 16.7 | 66 | 30 | 781 | −10.4 | 76 |
| 2,500 | 30 | 732 | −8.9 | 67 | 27 | 755 | 6.5 | 63 | 27 | 754 | 6.3 | 56 | 31 | 732 | −9.6 | 62 | 19 | 758 | 13.5 | 64 | 30 | 731 | −12.8 | 74 |
| 3,000 | 30 | 686 | −11.6 | 67 | 27 | 710 | 4.6 | 55 | 27 | 710 | 4.0 | 50 | 31 | 686 | −12.5 | 63 | 19 | 714 | 10.7 | 60 | 30 | 684 | −15.6 | 72 |
| 4,000 | 30 | 601 | −17.4 | 63 | 27 | 628 | −0.2 | 40 | 27 | 627 | −1.5 | 42 | 31 | 601 | −18.3 | 62 | 6 | 635 | 4.1 | 58 | 30 | 598 | −21.9 | 70 |
| 5,000 | 29 | 525 | −23.9 | 60 | 25 | 553 | −5.4 | 38 | 26 | 552 | −7.4 | 39 | 30 | 525 | −24.3 | 58 | | | | | 29 | 522 | −28.4 | 67 |
| 6,000 | 29 | 457 | −30.8 | 59 | 25 | 486 | −11.3 | 35 | 25 | 485 | −14.0 | 41 | 29 | 457 | −30.9 | 56 | | | | | 29 | 453 | −34.9 | 67 |
| 7,000 | 28 | 396 | −37.6 | 59 | 24 | 426 | −17.9 | 35 | 25 | 425 | −20.6 | 43 | 29 | 396 | −37.5 | 55 | | | | | 28 | 392 | −41.3 | ..... |
| 8,000 | 27 | 342 | −44.2 | ..... | 21 | 372 | −24.9 | 35 | 25 | 370 | −27.3 | 43 | 29 | 342 | −44.0 | ..... | | | | | 26 | 338 | −47.6 | ..... |
| 9,000 | 27 | 294 | −49.5 | ..... | 21 | 323 | −31.9 | 34 | 25 | 321 | −34.5 | 42 | 27 | 294 | −49.1 | ..... | | | | | 26 | 290 | −51.8 | ..... |
| 10,000 | 27 | 252 | −50.7 | ..... | 19 | 280 | −39.1 | ..... | 24 | 278 | −42.0 | ..... | 27 | 252 | −51.5 | ..... | | | | | 25 | 248 | −52.2 | ..... |
| 11,000 | 27 | 217 | −50.0 | ..... | 19 | 242 | −46.2 | ..... | 24 | 240 | −49.3 | ..... | 26 | 217 | −50.8 | ..... | | | | | 20 | 213 | −51.3 | ..... |
| 12,000 | 25 | 186 | −48.8 | ..... | 18 | 207 | −52.4 | ..... | 23 | 205 | −55.8 | ..... | 26 | 186 | −49.1 | ..... | | | | | 20 | 183 | −50.3 | ..... |
| 13,000 | 23 | 160 | −48.2 | ..... | 18 | 177 | −57.9 | ..... | 22 | 175 | −60.6 | ..... | 23 | 159 | −47.8 | ..... | | | | | 19 | 156 | −50.4 | ..... |
| 14,000 | 22 | 137 | −48.0 | ..... | 16 | 151 | −60.1 | ..... | 20 | 149 | −64.2 | ..... | 23 | 137 | −47.8 | ..... | | | | | 17 | 134 | −50.4 | ..... |
| 15,000 | 20 | 118 | −48.2 | ..... | 15 | 128 | −62.1 | ..... | 17 | 126 | −66.2 | ..... | 19 | 118 | −48.0 | ..... | | | | | 13 | 115 | −51.3 | ..... |
| 16,000 | 15 | 102 | −48.6 | ..... | 15 | 109 | −64.2 | ..... | 17 | 107 | −66.5 | ..... | 15 | 102 | −48.2 | ..... | | | | | 7 | 98 | −52.0 | ..... |
| 17,000 | 7 | 87 | −48.9 | ..... | 15 | 92 | −64.6 | ..... | 15 | 91 | −65.8 | ..... | 12 | 87 | −48.4 | ..... | | | | | ..... | ..... | ..... | ..... |
| 18,000 | ..... | ..... | ..... | ..... | 13 | 78 | −63.4 | ..... | 13 | 77 | −63.9 | ..... | 5 | 75 | −48.9 | ..... | | | | | ..... | ..... | ..... | ..... |
| 19,000 | ..... | ..... | ..... | ..... | 11 | 66 | −61.6 | ..... | 9 | 65 | −61.4 | ..... | ..... | ..... | ..... | ..... | | | | | ..... | ..... | ..... | ..... |
| 20,000 | ..... | ..... | ..... | ..... | 7 | 56 | −59.2 | ..... | 6 | 55 | −59.3 | ..... | ..... | ..... | ..... | ..... | | | | | ..... | ..... | ..... | ..... |

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by airplanes and radiosondes during October 1941*—Continued

| Altitude (meters) m. s. l. | Juneau, Alaska (49 m.) | | | | Ketchikan, Alaska (26 m.) | | | | Nome, Alaska (14 m.) | | | | St. Thomas, V. I.[1] [2] (8 m.) | | | | San Juan, P. R. (15 m.) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 31 | 1001 | 6.7 | 84 | 27 | 1008 | 8.8 | 88 | 30 | 1002 | 1.4 | 78 | 31 | 1015 | 27.2 | 77 | 31 | 1013 | 25.5 | 88 |
| 500 | 31 | 947 | 4.5 | 82 | 27 | 952 | 6.4 | 88 | 30 | 943 | −1.9 | 81 | 31 | 960 | 23.7 | 93 | 31 | 960 | 23.3 | 89 |
| 1,000 | 29 | 891 | 1.4 | 83 | 27 | 895 | 3.3 | 88 | 29 | 886 | −4.5 | 80 | 31 | 906 | 20.8 | 78 | 31 | 906 | 20.2 | 85 |
| 1,500 | 27 | 837 | −1.1 | 83 | 27 | 842 | 0.8 | 88 | 29 | 831 | −7.0 | 76 | 31 | 855 | 17.9 | 75 | 31 | 856 | 17.3 | 79 |
| 2,000 | 26 | 786 | −3.9 | 83 | 26 | 791 | −1.9 | 86 | 29 | 779 | −9.5 | 73 | 31 | 806 | 15.5 | 71 | 31 | 806 | 14.6 | 73 |
| 2,500 | 26 | 737 | −6.8 | 81 | 26 | 742 | −4.5 | 80 | 29 | 730 | −12.3 | 71 | 31 | 760 | 13.4 | 60 | 31 | 760 | 12.3 | 66 |
| 3,000 | 22 | 691 | −9.7 | 79 | 26 | 696 | −7.5 | 76 | 29 | 683 | −15.0 | 70 | 31 | 716 | 11.4 | 49 | 30 | 715 | 9.9 | 56 |
| 4,000 | 22 | 606 | −15.7 | 76 | 23 | 612 | −13.7 | 72 | 28 | 597 | −20.9 | 66 | 31 | 635 | 6.0 | 36 | 30 | 633 | 4.5 | 51 |
| 5,000 | 21 | 530 | −22.4 | 72 | 21 | 536 | −19.9 | 70 | 26 | 521 | −26.8 | 59 | | | | | 29 | 560 | −0.9 | 45 |
| 6,000 | 20 | 462 | −28.8 | 65 | 20 | 467 | −26.7 | 68 | 26 | 453 | −33.4 | 56 | | | | | 28 | 493 | −6.8 | 40 |
| 7,000 | 20 | 401 | −35.6 | 63 | 19 | 406 | −33.3 | 66 | 26 | 392 | −39.7 | 55 | | | | | 29 | 433 | −13.3 | 40 |
| 8,000 | 18 | 346 | −42.2 | ---- | 18 | 351 | −40.1 | ---- | 24 | 338 | −45.5 | ---- | | | | | 28 | 380 | −20.0 | 40 |
| 9,000 | 17 | 298 | −47.6 | ---- | 15 | 303 | −45.8 | ---- | 22 | 291 | −49.6 | ---- | | | | | 28 | 330 | −27.1 | 40 |
| 10,000 | 14 | 256 | −48.4 | ---- | 15 | 260 | −48.2 | ---- | 22 | 250 | −50.6 | ---- | | | | | 28 | 287 | −34.3 | 39 |
| 11,000 | 14 | 220 | −47.8 | ---- | 14 | 224 | −50.0 | ---- | 20 | 214 | −49.4 | ---- | | | | | 28 | 248 | −41.6 | ---- |
| 12,000 | 14 | 189 | −47.4 | ---- | 14 | 192 | −51.1 | ---- | 20 | 184 | −48.4 | ---- | | | | | 28 | 214 | −48.8 | ---- |
| 13,000 | 14 | 162 | −47.9 | ---- | 14 | 164 | −51.6 | ---- | 18 | 158 | −47.1 | ---- | | | | | 28 | 184 | −55.9 | ---- |
| 14,000 | 13 | 139 | −48.0 | ---- | 13 | 140 | −52.3 | ---- | 17 | 136 | −46.7 | ---- | | | | | 28 | 156 | −62.7 | ---- |
| 15,000 | 11 | 120 | −48.1 | ---- | 10 | 120 | −52.6 | ---- | 17 | 117 | −46.5 | ---- | | | | | 28 | 133 | −68.7 | ---- |
| 16,000 | 9 | 102 | −48.3 | ---- | 7 | 103 | −52.6 | ---- | 14 | 100 | −46.5 | ---- | | | | | 27 | 112 | −73.1 | ---- |
| 17,000 | 5 | 88 | −48.9 | ---- | | | | | 8 | 86 | −46.8 | ---- | | | | | 27 | 94 | −75.1 | ---- |
| 18,000 | | | | | | | | | 7 | 74 | −47.0 | ---- | | | | | 27 | 80 | −72.9 | ---- |
| 19,000 | | | | | | | | | | | | | | | | | 26 | 67 | −68.6 | ---- |
| 20,000 | | | | | | | | | | | | | | | | | 18 | 57 | −63.9 | ---- |
| 21,000 | | | | | | | | | | | | | | | | | 8 | 48 | −60.9 | ---- |
| 22,000 | | | | | | | | | | | | | | | | | 6 | 41 | −58.1 | ---- |

[1] U. S. Navy.
[2] Airplane observations.
[3] Observations made on Coast Guard vessels in or near the 5° square.
Lat. 35.00′ N. to 40.00′ N.
Long. 55.00′ W. to 60.00′ W.
[4] Observations made on Coast Guard vessels in or near the 5° square.
Lat. 35.00′ N. to 40.00′ N.
Long. 45.00′ W. to 50.00′ W.

NOTE.—All observations taken at 11 p. m. 75th meridian time, except at Lakehurst, N. J., where they are taken near 5 a. m., E. S. T., at Norfolk, Va., where they are taken at about 6 a. m., and at Pearl Harbor, T. H., St. Thomas, V. I., and Coco Solo, C. Z., at about 7 a. m.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity data are missing for some observations at certain levels; also, the humidity data are not used in daily observations when the temperature is below −40° C.

## Late Reports for September and August

| Altitude (meters) m. s. l. | SEPTEMBER 1941 | | | | AUGUST 1941 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | St. Thomas, V. I. 1-2 (8 m.) | | | | Barrow, Alaska (6 m.) | | | | Joliet, Ill. (178 m.) | | | | St. Thomas, V. I. 1-2 (8 m.) | | | | Swan Island, W. I. (10 m.) | | | |
| | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity | Number of observations | Pressure | Temperature | Relative humidity |
| Surface | 26 | 1,014 | 27.8 | 74 | 31 | 1,016 | 3.5 | 92 | 29 | 995 | 18.5 | 85 | 28 | 1,016 | 27.8 | 74 | 31 | 1,013 | 27.1 | 84 |
| 500 | 26 | 958 | 24.3 | 92 | 31 | 957 | 5.1 | 83 | 29 | 958 | 20.9 | 69 | 28 | 961 | 24.3 | 91 | 31 | 958 | 24.3 | 87 |
| 1,000 | 26 | 905 | 21.6 | 76 | 31 | 900 | 4.6 | 73 | 29 | 904 | 18.4 | 67 | 28 | 907 | 21.3 | 79 | 31 | 905 | 21.6 | 80 |
| 1,500 | 26 | 854 | 18.7 | 71 | 31 | 846 | 3.0 | 68 | 29 | 853 | 15.2 | 72 | 28 | 856 | 18.6 | 72 | 31 | 854 | 18.8 | 75 |
| 2,000 | 26 | 805 | 16.5 | 63 | 31 | 795 | 1.0 | 65 | 29 | 804 | 12.3 | 72 | 28 | 808 | 16.4 | 68 | 31 | 806 | 16.2 | 71 |
| 2,500 | 26 | 759 | 14.2 | 53 | 31 | 747 | −1.2 | 63 | 29 | 757 | 9.6 | 71 | 28 | 762 | 14.1 | 59 | 31 | 759 | 13.6 | 66 |
| 3,000 | 26 | 716 | 11.8 | 48 | 31 | 701 | −3.9 | 61 | 29 | 712 | 6.9 | 67 | 28 | 718 | 11.8 | 50 | 31 | 716 | 10.9 | 61 |
| 4,000 | 26 | 635 | 6.4 | 40 | 31 | 617 | −9.5 | 60 | 29 | 630 | 1.0 | 63 | 28 | 637 | 6.3 | 47 | 31 | 634 | 4.8 | 60 |
| 5,000 | | | | | 31 | 542 | −15.6 | 57 | 26 | 556 | −4.4 | 56 | | | | | 30 | 560 | −1.0 | 56 |
| 6,000 | | | | | 31 | 474 | −22.2 | 55 | 25 | 489 | −10.1 | 49 | | | | | 30 | 494 | −6.9 | 52 |
| 7,000 | | | | | 31 | 413 | −29.1 | 53 | 24 | 429 | −16.5 | 45 | | | | | 30 | 434 | −13.3 | 51 |
| 8,000 | | | | | 31 | 358 | −36.6 | 53 | 24 | 374 | −23.8 | 42 | | | | | 30 | 380 | −19.9 | 50 |
| 9,000 | | | | | 30 | 309 | −44.0 | ---- | 24 | 326 | −31.2 | 38 | | | | | 30 | 331 | −26.9 | 48 |
| 10,000 | | | | | 29 | 266 | −50.5 | ---- | 23 | 282 | −38.7 | ---- | | | | | 30 | 288 | −34.5 | 48 |
| 11,000 | | | | | 29 | 228 | −51.9 | ---- | 19 | 244 | −46.0 | ---- | | | | | 30 | 248 | −42.7 | ---- |
| 12,000 | | | | | 28 | 196 | −49.7 | ---- | 19 | 209 | −52.9 | ---- | | | | | 30 | 214 | −50.9 | ---- |
| 13,000 | | | | | 27 | 168 | −48.0 | ---- | 17 | 179 | −58.4 | ---- | | | | | 30 | 183 | −59.0 | ---- |
| 14,000 | | | | | 25 | 144 | −47.2 | ---- | 17 | 152 | −62.5 | ---- | | | | | 28 | 155 | −66.9 | ---- |
| 15,000 | | | | | 25 | 124 | −46.9 | ---- | 16 | 129 | −64.7 | ---- | | | | | 28 | 131 | −72.7 | ---- |
| 16,000 | | | | | 24 | 106 | −46.7 | ---- | 15 | 110 | −64.7 | ---- | | | | | 25 | 111 | −75.7 | ---- |
| 17,000 | | | | | 22 | 91 | −46.6 | ---- | 11 | 93 | −63.1 | ---- | | | | | 23 | 93 | −75.5 | ---- |
| 18,000 | | | | | 19 | 78 | −46.2 | ---- | 6 | 79 | −59.9 | ---- | | | | | 19 | 78 | −72.6 | ---- |
| 19,000 | | | | | 13 | 67 | −46.0 | ---- | | | | | | | | | 16 | 66 | −69.1 | ---- |
| 20,000 | | | | | 8 | 58 | −45.8 | ---- | | | | | | | | | 6 | 56 | −65.5 | ---- |

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m. (75th meridian time) during October 1941. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

| Altitude (meters) m. s. l. | Abilene, Tex. (537 m.) | | | Albuquerque, N. Mex. (1,630 m.) | | | Atlanta, Ga. (299 m.) | | | Billings, Mont. (1,095 m.) | | | Bismarck, N. Dak. (512 m.) | | | Boise, Idaho (866 m.) | | | Brownsville, Tex. (7 m.) | | | Buffalo, N. Y. (220 m.) | | | Burlington, Vt. (132 m.) | | | Charleston, S. C. (17 m.) | | | Chicago, Ill. (192 m.) | | | Cincinnati, Ohio (152 m.) | | | Denver, Colo. (1,627 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity |
| Surface | 29 | 184 | 2.4 | 30 | 198 | 3.1 | 30 | 41 | 0.5 | 29 | 228 | 1.8 | 29 | 290 | 2.2 | 30 | 321 | 3.2 | 31 | 130 | 4.2 | 30 | 264 | 3.5 | 29 | 226 | 1.4 | 31 | 129 | 1.4 | 29 | 251 | 1.2 | 30 | 243 | 0.9 | 29 | 31 | 1.2 |
| 500 | | | | | | | 30 | 89 | 0.7 | | | | | | | | | | 31 | 136 | 5.2 | 30 | 259 | 5.6 | 29 | 246 | 4.8 | 31 | 125 | 2.2 | 29 | 221 | 4.0 | 30 | 243 | 3.4 | | | |
| 1,000 | 29 | 186 | 5.0 | | | | 28 | 82 | 0.4 | | | | 29 | 295 | 2.5 | 30 | 316 | 3.8 | 28 | 156 | 5.6 | 26 | 261 | 7.8 | 24 | 272 | 7.4 | 31 | 131 | 1.5 | 27 | 241 | 6.4 | 26 | 248 | 5.2 | | | |
| 1,500 | 28 | 199 | 5.7 | | | | 27 | 172 | 0.8 | 29 | 251 | 3.3 | 28 | 283 | 4.7 | 30 | 315 | 2.6 | 26 | 159 | 4.6 | 21 | 267 | 9.7 | 20 | 282 | 9.8 | 29 | 212 | 1.5 | 24 | 259 | 8.4 | 25 | 255 | 7.6 | | | |
| 2,000 | 26 | 206 | 7.1 | 30 | 195 | 3.7 | 25 | 297 | 1.3 | 29 | 269 | 4.2 | 24 | 288 | 6.7 | 30 | 304 | 2.5 | 25 | 166 | 4.2 | 19 | 269 | 10.8 | 17 | 290 | 12.0 | 27 | 252 | 2.3 | 23 | 275 | 10.7 | 24 | 269 | 8.9 | 29 | 8 | 1.5 |
| 2,500 | 26 | 216 | 7.8 | 30 | 207 | 4.0 | 22 | 304 | 3.2 | 28 | 272 | 5.2 | 22 | 281 | 8.2 | 28 | 284 | 3.2 | 23 | 161 | 4.1 | 17 | 275 | 13.4 | 13 | 289 | 13.0 | 27 | 266 | 2.8 | 23 | 273 | 11.7 | 22 | 267 | 11.3 | 28 | 42 | 0.9 |
| 3,000 | 22 | 230 | 8.9 | 30 | 228 | 5.1 | 21 | 294 | 3.8 | 28 | 286 | 5.5 | 21 | 282 | 10.5 | 25 | 276 | 2.6 | 19 | 163 | 4.1 | 12 | 276 | 14.9 | 10 | 298 | 14.5 | 27 | 277 | 4.2 | 22 | 276 | 13.7 | 21 | 268 | 12.7 | 24 | 260 | 2.5 |
| 4,000 | 20 | 241 | 11.1 | 24 | 256 | 9.7 | 18 | 287 | 5.8 | 24 | 284 | 6.8 | 20 | 281 | 13.3 | 24 | 266 | 1.8 | 18 | 158 | 4.5 | 10 | 282 | 15.4 | | | | 26 | 276 | 6.6 | 18 | 284 | 17.0 | 17 | 284 | 15.3 | 22 | 270 | 7.1 |
| 5,000 | 14 | 249 | 16.3 | 23 | 254 | 13.3 | 17 | 286 | 8.4 | 22 | 281 | 7.7 | 20 | 282 | 16.2 | 20 | 298 | 2.6 | 17 | 174 | 4.1 | | | | | | | 25 | 272 | 6.6 | 17 | 289 | 19.5 | 16 | 285 | 18.4 | 21 | 266 | 10.4 |
| 6,000 | 13 | 253 | 17.6 | 19 | 256 | 14.0 | 16 | 281 | 9.6 | 21 | 275 | 9.3 | 19 | 278 | 19.3 | 19 | 295 | 4.7 | 10 | 182 | 5.8 | | | | | | | 22 | 273 | 7.5 | 14 | 295 | 25.3 | 11 | 276 | 20.9 | 19 | 267 | 13.7 |
| 8,000 | 11 | 245 | 22.5 | 15 | 267 | 20.7 | 15 | 279 | 11.3 | 14 | 310 | 7.6 | 13 | 276 | 21.5 | 12 | 300 | 8.9 | | | | | | | | | | 12 | 284 | 13.6 | 10 | 298 | 31.0 | | | | 16 | 263 | 15.8 |
| 10,000 | | | | | | | 15 | 279 | 13.9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 | 268 | 18.2 |
| 12,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | 264 | 18.6 |
| 14,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Altitude (meters) m. s. l. | El Paso, Tex. (1,196 m.) | | | Ely, Nev. (1,910 m.) | | | Grand Junction, Colo. (1,413 m.) | | | Greensboro, N. C. (271 m.) | | | Havre, Mont. (767 m.) | | | Jacksonville, Fla. (14 m.) | | | Las Vegas, Nev. (570 m.) | | | Little Rock Ark. (79 m.) | | | Medford, Oreg. (410 m.) | | | Miami, Fla. (10 m.) | | | Minneapolis, Minn. (265 m.) | | | Mobile, Ala. (8 m.) | | | Nashville, Tenn. (194 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity |
| Surface | 30 | 211 | 1.6 | 31 | 269 | 0.5 | 30 | 263 | 0.8 | 31 | 253 | 0.8 | 30 | 258 | 2.9 | 30 | 91 | 4.3 | 30 | 104 | 1.1 | 27 | 165 | 1.9 | 29 | 326 | 0.9 | 31 | 95 | 4.0 | 28 | 239 | 0.9 | 31 | 115 | 1.1 | 31 | 213 | 1.2 |
| 500 | | | | | | | | | | 31 | 248 | 2.0 | | | | 30 | 97 | 5.0 | | | | 27 | 178 | 2.9 | 29 | 318 | 1.3 | 31 | 93 | 5.3 | 28 | 235 | 1.8 | 31 | 117 | 1.9 | 31 | 218 | 2.8 |
| 1,000 | | | | | | | | | | 31 | 245 | 3.5 | 30 | 257 | 5.3 | 27 | 115 | 2.5 | 30 | 119 | 1.5 | 25 | 207 | 3.3 | 29 | 344 | 1.2 | 31 | 89 | 4.3 | 24 | 234 | 2.9 | 29 | 126 | 1.6 | 31 | 216 | 4.5 |
| 1,500 | 29 | 217 | 2.9 | | | | | | | 31 | 258 | 4.7 | 30 | 260 | 6.3 | 24 | 159 | 1.3 | 30 | 139 | 1.3 | 24 | 216 | 4.1 | 28 | 282 | 0.1 | 30 | 91 | 3.1 | 22 | 275 | 4.9 | 26 | 70 | 1.1 | 31 | 226 | 5.3 |
| 2,000 | 30 | 224 | 3.8 | 31 | 283 | 0.6 | 30 | 262 | 1.1 | 30 | 277 | 6.7 | 29 | 265 | 7.3 | 24 | 182 | 0.9 | 30 | 216 | 1.8 | 24 | 217 | 5.7 | 27 | 180 | 0.9 | 26 | 102 | 2.5 | 17 | 276 | 9.1 | 24 | 101 | 0.2 | 27 | 243 | 5.2 |
| 2,500 | 30 | 229 | 4.6 | 31 | 207 | 0.7 | 30 | 204 | 1.8 | 30 | 278 | 8.6 | 28 | 267 | 7.4 | 23 | 290 | 1.6 | 29 | 233 | 2.2 | 20 | 236 | 6.8 | 27 | 258 | 0.4 | 25 | 127 | 2.7 | 17 | 282 | 11.1 | 19 | 273 | 0.8 | 24 | 258 | 6.1 |
| 3,000 | 29 | 242 | 7.4 | 31 | 234 | 1.6 | 28 | 213 | 4.0 | 28 | 283 | 8.9 | 26 | 274 | 8.1 | 23 | 284 | 2.1 | 25 | 243 | 1.4 | 18 | 240 | 7.7 | 24 | 298 | 0.4 | 24 | 114 | 3.1 | 16 | 293 | 13.6 | 15 | 282 | 1.4 | 20 | 269 | 7.2 |
| 4,000 | 25 | 250 | 10.6 | 25 | 268 | 3.0 | 24 | 201 | 4.9 | 26 | 282 | 10.9 | 21 | 273 | 9.6 | 22 | 298 | 2.7 | 23 | 261 | 5.0 | 14 | 260 | 9.9 | 24 | 327 | 3.3 | 24 | 108 | 2.7 | 16 | 289 | 16.3 | 14 | 245 | 2.5 | 16 | 278 | 9.5 |
| 5,000 | 21 | 249 | 13.0 | 19 | 251 | 6.4 | 20 | 235 | 5.2 | 23 | 284 | 12.4 | 19 | 272 | 7.4 | 21 | 301 | 3.1 | 19 | 268 | 8.1 | 11 | 256 | 10.8 | 23 | 332 | 4.5 | 25 | 83 | 2.3 | 16 | 284 | 19.7 | 11 | 283 | 4.7 | 13 | 275 | 12.6 |
| 6,000 | 19 | 253 | 15.8 | 17 | 267 | 7.0 | 17 | 261 | 5.9 | 21 | 285 | 16.9 | 15 | 293 | 7.1 | 20 | 296 | 3.6 | 19 | 273 | 11.7 | | | | 21 | 342 | 6.4 | 23 | 72 | 1.7 | 12 | 291 | 21.4 | | | | 10 | 289 | 16.3 |
| 8,000 | 12 | 250 | 20.0 | 13 | 274 | 10.6 | | | | 15 | 284 | 17.4 | 11 | 289 | 9.2 | 17 | 295 | 6.2 | 17 | 269 | 18.1 | | | | 18 | 327 | 7.6 | 18 | 63 | 2.5 | 10 | 283 | 27.6 | | | | | | |
| 10,000 | | | | 12 | 279 | 14.0 | | | | 12 | 295 | 22.7 | | | | 13 | 305 | 9.1 | 13 | 276 | 20.3 | | | | 15 | 314 | 14.4 | 16 | 336 | 3.4 | | | | | | | | | |
| 12,000 | | | | 10 | 274 | 20.3 | | | | | | | | | | 11 | 294 | 8.2 | 11 | 265 | 22.9 | | | | 10 | 324 | 15.3 | 12 | 297 | 4.6 | | | | | | | | | |
| 14,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Altitude (meters) m. s. l. | New York, N. Y. (15 m.) | | | Oakland, Calif. (8 m.) | | | Oklahoma, City, Okla. (402 m.) | | | Omaha, Nebr. (306 m.) | | | Phoenix, Ariz. (338 m.) | | | Rapid City, S. Dak. (982 m.) | | | St. Louis, Mo. (181 m.) | | | San Antonio, Tex. (180 m.) | | | San Diego, Calif. (15 m.) | | | Sault St. Marie, Mich. (230 m.) | | | Seattle, Wash. (12 m.) | | | Spokane, Wash. (603 m.) | | | Washington, D. C. (24 m.) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity | Observations | Direction | Velocity |
| Surface | 28 | 275 | 3.4 | 31 | 258 | 2.9 | 25 | 198 | 2.2 | 29 | 191 | 1.5 | 31 | 237 | 0.9 | 28 | 356 | 1.8 | 27 | 197 | 1.0 | 30 | 120 | 2.2 | 31 | 250 | 2.9 | 24 | 292 | 3.2 | 30 | 199 | 2.1 | 28 | 210 | 1.5 | 31 | 260 | 2.6 |
| 500 | 28 | 267 | 5.1 | 31 | 325 | 1.5 | 25 | 183 | 2.7 | 28 | 183 | 2.4 | 31 | 221 | 1.2 | | | | 27 | 211 | 2.3 | 30 | 130 | 3.2 | 31 | 247 | 3.0 | 24 | 288 | 3.9 | 30 | 208 | 3.5 | | | | 31 | 260 | 4.4 |
| 1,000 | 28 | 279 | 6.2 | 30 | 335 | 1.8 | 22 | 189 | 4.6 | 27 | 203 | 3.2 | 31 | 203 | 1.1 | 28 | 346 | 1.6 | 26 | 210 | 4.3 | 30 | 146 | 3.7 | 30 | 222 | 0.9 | 22 | 289 | 7.8 | 27 | 216 | 5.0 | 28 | 212 | 2.2 | 30 | 263 | 5.6 |
| 1,500 | 25 | 288 | 8.1 | 28 | 323 | 2.1 | 20 | 218 | 7.0 | 23 | 237 | 4.6 | 31 | 180 | 1.9 | 28 | 310 | 3.5 | 25 | 238 | 6.0 | 28 | 169 | 4.5 | 29 | 169 | 0.6 | 17 | 275 | 8.8 | 20 | 217 | 4.5 | 25 | 224 | 3.5 | 29 | 284 | 7.5 |
| 2,000 | 22 | 290 | 10.6 | 26 | 323 | 2.2 | 20 | 222 | 8.8 | 19 | 261 | 5.4 | 31 | 189 | 3.7 | 25 | 287 | 3.5 | 22 | 264 | 7.3 | 26 | 186 | 5.4 | 25 | 226 | 0.7 | 13 | 273 | 10.1 | 18 | 225 | 3.4 | 24 | 235 | 4.8 | 26 | 295 | 10.4 |
| 2,500 | 20 | 294 | 14.0 | 25 | 326 | 2.7 | 19 | 239 | 9.5 | 15 | 281 | 6.1 | 30 | 209 | 5.7 | 22 | 283 | 5.7 | 21 | 267 | 9.6 | 22 | 206 | 5.9 | 24 | 267 | 2.6 | 10 | 280 | 11.2 | 17 | 236 | 4.1 | 22 | 245 | 5.4 | 24 | 288 | 11.6 |
| 3,000 | 15 | 293 | 11.5 | 25 | 332 | 4.6 | 17 | 241 | 10.0 | 14 | 284 | 8.9 | 30 | 220 | 6.2 | 22 | 286 | 6.6 | 19 | 268 | 10.5 | 20 | 222 | 5.7 | 21 | 277 | 4.0 | | | | 14 | 252 | 4.5 | 19 | 250 | 6.3 | 22 | 280 | 13.1 |
| 4,000 | | | | 22 | 329 | 7.6 | 16 | 246 | 13.1 | 14 | 275 | 10.5 | 29 | 240 | 8.8 | 21 | 277 | 8.7 | 18 | 280 | 12.5 | 15 | 237 | 7.0 | 19 | 289 | 7.5 | | | | 12 | 253 | 3.4 | 12 | 274 | 3.3 | 21 | 284 | 15.4 |
| 5,000 | | | | 21 | 315 | 9.4 | 13 | 245 | 14.3 | 14 | 269 | 13.0 | 26 | 247 | 11.8 | 21 | 274 | 10.2 | 15 | 277 | 15.2 | 12 | 242 | 8.4 | 14 | 267 | 10.1 | | | | | | | 11 | 279 | 2.2 | 15 | 288 | 17.7 |
| 6,000 | | | | 20 | 308 | 10.9 | 10 | 253 | 18.2 | 14 | 272 | 14.7 | 21 | 249 | 13.0 | 19 | 276 | 11.7 | 11 | 287 | 16.5 | 11 | 242 | 10.6 | | | | | | | | | | | | 14 | 291 | 20.6 |
| 8,000 | | | | 12 | 270 | 11.7 | | | | 12 | 274 | 19.9 | 15 | 266 | 16.5 | 11 | 284 | 11.8 | | | | | | | | | | | | | | | | | | 11 | 300 | 28.6 |
| 10,000 | | | | | | | | | | | | | 12 | 264 | 21.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 3.—*Maximum free air wind velocities, (m. p. s.), for different sections of the United States based on pilot-balloon observations during October 1941*

| Section | Surface to 2,500 meters (m. s. l.) | | | | | Between 2,500 and 5,000 meters (m. s. l.) | | | | | Above 5,000 meters (m. s. l.) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum velocity | Direction | Altitude (m.) m. s. l. | Date | Station | Maximum velocity | Direction | Altitude (m.) m. s. l. | Date | Station | Maximum velocity | Direction | Altitude (m.) m. s. l. | Date | Station |
| Northeast [1] | 42.6 | WSW<br>W | 830<br>1,740 | 5<br>8 | Buffalo, N. Y.<br>Portland, Maine | 50.4 | NW | 3,130 | 23 | Kylertown, Pa. | 70.4 | WNW | 8,820 | 17 | Albany, N. Y. |
| East-Central [2] | 36.2 | SW | 2,420 | 27 | Huntington, W. Va. | 55.4 | NW | 4,400 | 10 | Huntington, W. Va. | 70.0 | W | 11,570 | 28 | Greensboro, N. C. |
| Southeast [3] | 26.3 | SW | 1,650 | 27 | Atlanta, Ga. | 28.2 | NW | 3,940 | 10 | Spartanburg, S. C. | 55.2 | W | 20,500 | 20 | Miami, Fla. |
| North-Central [4] | 39.4 | W | 2,100 | 7 | Green Bay, Wis. | 63.2 | WSW | 3,170 | 7 | Muskegon, Mich. | 74.5 | WNW | 11,560 | 10 | Minneapolis, Minn. |
| Central [5] | 36.6 | WSW | 2,500 | 5 | Springfield, Ill. | 45.0 | SSW | 4,970 | 4 | Wichita, Kans. | 73.0 | WSW | 9,170 | 9 | Omaha, Nebr. |
| South-Central [6] | 34.0 | SW | 1,970 | 17 | Little Rock, Ark. | 38.4 | SW | 3,370 | 26 | Oklahoma City, Okla. | 64.0 | SW | 13,255 | 31 | San Antonio, Tex. |
| Northwest [7] | 36.0 | WSW | 1,900 | 3 | Billings, Mont. | 37.6 | WSW | 3,770 | 10 | Butte, Mont. | 77.0 | N | 10,220 | 2 | Great Falls, Mont. |
| West-Central [8] | 33.4 | NNW | 430 | 2 | Sacramento, Calif. | 51.6 | NNE | 4,650 | 2 | Reno, Nev. | 76.0 | WNW | 11,480 | 25 | Reno, Nev. |
| Southwest [9] | 29.9 | SW | 2,460 | 5 | Las Vegas, Nev. | 40.0 | SW<br>N | 3,200<br>5,000 | 13<br>2 | Winslow, Ariz.<br>Bakersfield, Calif. | 71.7 | SW | 12,320 | 8 | Las Vegas, Nev. |

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and Western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, Northern Nevada, and Northern California.
[9] Southern California, Southern Nevada, Arizona, New Mexico, and extreme West Texas.

## WEATHER ON THE NORTH ATLANTIC OCEAN

By H. C. HUNTER

*Atmospheric pressure.*—The pressure during October 1941, averaged above normal over large portions of the North Atlantic, especially near the coasts of the South Atlantic States, Cuba, and the Bahamas. On the other hand it averaged below normal near the Maritime Provinces, Newfoundland, and Labrador.

The extremes of pressure noted in vessel reports at hand were 1,036.2 and 991.5 millibars (30.60 and 29.28 inches). The high reading was noted during the forenoon of the 30th, about 50 miles from Montauk Point, in a south-southwest direction. Table 1 shows that the pressure was slightly higher at Halifax, Nova Scotia, that day. The low mark was noted near southeastern Newfoundland during the early afternoon of the 20th. During other portions of the month both Belle Isle and Halifax recorded lower pressures.

In low latitudes readings slightly below 1,000 millibars (29.53 inches) were noted by two vessels near 29° N., 75° W., on the 10th, when within the area affected by a storm of tropical origin. However, this storm, when crossing the Bahama Islands several days earlier, as indicated in an article on page 303 of this REVIEW, resulted in a pressure of 964.4 millibars (28.48 inches) on Cat Island.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, October 1941*

| Station | Average pressure | Departure from normal | Highest | Date | Lowest | Date |
|---|---|---|---|---|---|---|
| | *Millibars* | *Millibars* | *Millibars* | | *Millibars* | |
| Horta, Azores | 1,020.0 | +0.4 | 1,031 | 13 | 1,009 | 7 |
| Belle Isle, Newfoundland | 1,007.9 | −3.3 | 1,029 | 30 | 986 | 12 |
| Halifax, Nova Scotia | 1,014.8 | −2.5 | 1,038 | 30 | 989 | 11 |
| Nantucket | 1,018.0 | +.4 | 1,036 | 30 | 1,000 | 10 |
| Hatteras | 1,020.3 | +2.3 | 1,030 | 29 | 1,009 | 10 |
| Turks Island [1] | 1,016.0 | +1.8 | 1,019 | 18 | 1,012 | 16 |
| Key West | 1,016.3 | +2.4 | 1,022 | 14 | 1,011 | 6 |
| New Orleans | 1,017.3 | +.4 | 1,024 | 4 | 1,010 | 2 |

[1] For 27 days.

NOTE.—All data based on available observations, departures compiled from best available normals related to times of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

*Cyclones and gales.*—The vessel reports available indicate a comparatively quiet October. In middle latitudes two strong gales and several fresh gales occurred. The period centering on the 20th appears to have been the most eventful, and from the 8th to 11th likewise was somewhat unquiet.

The opening week and the period from 22d to 26th seem to have been remarkably undisturbed from the 30th parallel northward.

*Tropical disturbances.*—In another portion of this issue an account is presented of two disturbances of tropical origin. The earlier of these cyclones was noted to northward of the Virgin Islands on the 3d; it moved westward across the Bahamas and extreme southern Florida, turned northward over the Gulf and traversed parts of western Florida, southern Georgia and South Carolina, then moved southeastward over the Atlantic to near latitude 30°, thence continued mainly eastward till beyond the field of observation.

This storm was of comparatively small diameter during much of its course, and was for awhile remarkably intense, especially over the Bahamas. A few lives are reported lost in the Bahamas and some in northwestern Florida. No vessel report that relates to this storm indicates a higher wind than a strong gale (force 9).

The later LOW was of short path and little moment. Its track was approximately the middle portion of the track of the earlier storm, and the time was about 13 days later. The greatest wind force noted in vessel reports as a result of this disturbance was a moderate gale (force 7).

*Line squalls.*—About 150 miles to eastward of the extreme southeastern coast of Maryland line squalls were noted from a vessel which furnishes this report:

October 1, 9:30 p. m., 75th meridian time (equivalent to October 2, 2:30 a. m., Greenwich mean time), in latitude 38°04′ N., longitude 73°00′ W., barometer 30.16 inches (1021.3 millibars), having risen 0.03 inch during 1½ hours preceding, temperature of air 72°, of water 70°; three line squalls, moving southeastward, ranging from about 15 to 20 miles in length, passed at intervals of about 5 to 8 minutes. The clouds appeared in a very compact mass and in an almost straight line. During this time the wind shifted from southwest, Beaufort force 3, to northwest, same force; within the succeeding 3½ hours the wind turned partly back, becoming west, force 2. Other clouds at the time of the squalls were alto-cumulus, about two-tenths of sky being covered, apart from the line squall masses which covered a third of the overhead as they passed. Sea small southwest. Ship's course north-northeast, speed 14 knots.

*Waterspouts near the Equator.*—Approximately 700 miles to northward of Cape St. Roque (in 5°10′ N., 33°04′ W.), on October 14, about 7:50 a. m., local time, with barometer 1,013.9 millibars (29.94 inches), waterspouts were observed, as reported below:

Wind fitful and light, shifting continuously from north to east to southwest and back. Partly cloudy and light rain squalls. Cloud movements shifty and in various directions.

One mass of clouds, apparently at a lower level than the surrounding cloud formations, drifting from a northeasterly direction, moved into what seemed to be a stationary mass of clouds, almost immediately forming a single spout close enough to our vessel that the boiling motion on the surface of the sea could be observed. As this spout seemed to gain in violence, and as the column darkened, it appeared to move in a northwesterly direction.

Perhaps 5 minutes later the column of the spout began to lighten and fade.

At this time two more spouts formed in the same cloud group further to the southeast. These two columns, one of which was very twisted, seemed to start fading almost as soon as they were well formed. These two lasted perhaps 5 minutes.

The first spout was in formation a little better than 10 minutes when it started fading. The column of the spout seemed to part in the center, the lower half dropping into the sea, and the upper half receding upward into the cloud. Some time after the lower half had dropped into the sea, however, and while the upper half was still fading upward, a motion was still visible on the surface of the sea.

Past weather was with light rain squalls, and the prevailing cloud formation was cumulonimbus.

*Fog.*—There was but little fog reported this month. The square 40° to 45° N., 65° to 70° W., had fog on 3 days, and a very few other ocean areas are indicated as having fog on 1 or 2 days. No fog was reported from any position to eastward of the 55th meridian, or to southward of the 35th parallel.

Even where most fog was noted, near the coasts of eastern New England and of Nova Scotia, the occurrence was apparently less than the normal during the month of October.

## OCEAN GALES AND STORMS, OCTOBER 1941

| Vessel | Position at time of lowest barometer | | Gale began October | Time of lowest barometer, October | Gale ended, October | Lowest barometer | Direction of wind when gale began | Direction and force of wind at time of lowest barometer | Direction of wind when gale ended | Direction and highest force of wind | Shifts of wind near time of lowest barometer |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Latitude | Longitude | | | | | | | | | |
| **NORTH ATLANTIC OCEAN** | ° ′ | ° ′ | | | | *Millibars* | | | | | |
| A vessel | 24 12N. | 69 18W. | 4 | 1p, 4 | 4 | 1,007.8 | ENE. | ENE, 7 | SE. | SE, 8 | ENE-E. |
| Do | 25 42N. | 77 12W. | 5 | 7p, 5 | 5 | 1,005.3 | NE. | ENE, 8 | E. | ENE, 8 | NE-E. |
| Do | 27 36N. | 82 42W. | 6 | 4p, 6 | 6 | 1,005.8 | NE. | SE, 9 | SE. | SE, 9 | NE-SE. |
| Do | 37 06N. | 69 24W. | 8 | 2p, 8 | 8 | 1,010.8 | W. | W, 8 | | W, 8 | |
| Do | 32 10N. | 77 30W. | 8 | 5p, 8 | 8 | 1,002.7 | SSW. | ESE, 9 | E. | ESE, 9 | S-E. |
| Do | 38 06N. | 58 18W. | 9 | 3a, 9 | 9 | 1,004.4 | SW. | SW, 9 | SW. | SW, 9 | SW-NNW. |
| Do | 29 12N. | 74 42W. | 10 | 2p, 10 | 10 | 999.3 | ESE. | NW, 6 | E. | ESE, 8 | ESE-NNE-W. |
| Do | 27 54N. | 79 42W. | 11 | 6p, 10 | 11 | 1,012.9 | NE. | N, 3 | NE. | N, 8 | |
| Do | 40 42N. | 68 06W. | 10 | 10p, 10 | 11 | 1,002.7 | NW. | WNW, 7 | NW. | NW, 8 | |
| Do | 38 30N. | 60 06W. | 11 | 8a, 11 | 11 | 1,002.0 | S. | SSW, 8 | W. | SW, 8 | SSW-NW. |
| Do | 29 00N. | 70 00W. | 11 | 8a, 11 | 12 | 1,003.1 | SW. | SW, 7 | NNE. | N, 8 | SW-W. |
| Do | 39 06N. | 47 48W. | 20 | 9a, 20 | 21 | 997.0 | SSE. | SSW, 7 | NW. | NW, 8 | SSE-SSW-NNW. |
| Do | 47 30N. | 52 40W. | 19 | 1p, 20 | 20 | 991.5 | SSE. | N, 9 | N. | N, 9 | NNE-N. |
| Do | 39 06N. | 60 42W. | 28 | 2a, 29 | 29 | 1,015.9 | | SSW, 8 | | SSW, 8 | S-SSW. |
| **NORTH PACIFIC OCEAN** | | | | | | | | | | | |
| A vessel | 42 36N. | 169 42E. | 1 | 5p, 30 [1] | 1 | 1,019.6 | NNW. | NNW, 6 | N. | N, 8 | |
| Do | 38 24N. | 124 00W. | 1 | 4p, 1 | 2 | 1,015.9 | NW. | NW, 7 | NW. | NW, 8 | |
| Do | 53 54N. | 156 12W. | 1 | 8a, 1 | 2 | 994.6 | SW. | SW, 6 | WSW. | SW, 8 | S-SW. |
| Do | 37 36N. | 124 54W. | 1 | 4a, 2 | 2 | 1,015.6 | WNW. | NW, 8 | NW. | NW, 8 | None. |
| Do | 57 30N. | 151 00E. | 2 | 3a, 4 | 3 | 997.0 | WNW. | NW, 5 | WNW. | WNW, 8 | WNW-NW. |
| Do | 48 00N. | 168 24W. | 3 | 7p, 3 | 4 | 1,013.2 | S. | S, 7 | S. | S, 8 | |
| Do | 49 18N. | 132 48W. | 8 | 9a, 9 | 9 | 999.3 | W. | SW, 7 | WSW. | W, 8 | E-SW-SSW. |
| Do | 48 19N. | 124 49W. | 9 | 12m, 9 | 9 | 1,003.4 | SE. | SE, 8 | SE. | SE, 8 | None. |
| Do | 30 36N. | 149 36E. | 10 | 4a, 11 | 11 | 1,018.0 | N. | NE, 8 | NE. | NE, 8 | None. |
| Do | 24 21N. | 156 20E. | 10 | 4a, 12 | 13 | 993.3 | NE. | NE, 10 | SE. | NE, 10 | |
| Do | 31 00N. | 154 00E. | 12 | 6a, 13 | 13 | 1,009.1 | ENE. | ENE, 7 | ESE. | ENE, 8 | ENE-ESE. |
| Do | 58 00N. | 148 54W. | 12 | 4p, 12 | 13 | 977.0 | NE. | N, 10 | SW. | NNE, 11 | NNE-WNW. |
| Do | [2] 14 00N. | 94 06W. | 12 | 4p, 12 | 13 | 1,008.8 | N. | NNW, 3 | ENE. | ENE, 8 | W-N. |
| Do | 32 48N. | 158 00E. | 12 | 6p, 14 | 15 | 1,003.1 | NE. | S, 10 | SW. | S, 10 | SSE-S. |
| Do | 51 18N. | 138 36W. | 14 | 10p, 14 | 15 | 985.4 | SE. | SW, 9 | SW. | SW, 9 | SE-W. |
| Do | [2] 49 29N. | 156 56W. | 14 | 10p, 14 | 15 | 981.4 | SSE. | SW, 8 | WSW. | WSW, 9 | SW-WSW. |
| Do | 54 36N. | 135 24W. | 15 | 9p, 15 | 16 | 997.6 | SE. | SE, 8 | | SE, 8 | |
| Do | 47 42N. | 151 12W. | 15 | 12p, 15 | 18 | 975.3 | SE. | SW, 10 | WNW. | SW, 10 | |
| Do | 42 05N. | 178 00W. | 15 | 3a, 16 | 16 | 986.8 | S. | SW, 11 | NNW. | SW, 11 | S-WSW. |
| Do | 58 36N. | 138 00W. | 16 | 9p, 16 | | 974.9 | | E, 8 | | E, 8 | |
| Do | 53 00N. | 148 18W. | 16 | 11p, 16 | 18 | 948.2 | SE. | SSW, 10 | W. | SW, 10 | S-SW. |
| Do | 58 06N. | 160 54W. | 17 | 7a, 17 | 17 | 985.1 | NW. | NW, 8 | NW. | NW, 8 | NNW-NW. |
| Do | [2] 51 38N. | 138 17W. | 15 | 4p, 17 | 19 | 988.2 | SW. | SSW, 8 | WSW. | S, 9 | S-SW. |
| Do | 56 18N. | 145 06W. | 16 | 9a, 17 | 18 | 957.3 | SSE. | ESE, 8 | WNW. | NW, 10 | SSE-E. |
| Do | 43 42N. | 133 48W. | 17 | 9a, 17 | 18 | 1,009.1 | W. | W, 4 | WNW. | WNW, 8 | S-W. |
| Do | 54 18N. | 155 18W. | 19 | 2a, 19 | 19 | 986.1 | | SW, 5 | NW. | NW, 9 | S-W. |
| Do | 40 00N. | 150 12W. | 20 | 2p, 20 | 20 | 1,004.4 | SSE. | SSE, 8 | SSE. | SSE, 8 | |
| Do | 26 51N. | 149 06W. | 23 | 1p, 23 | 23 | 1,011.2 | NW. | N, 10 | N. | N, 10 | Var.-N.-NNW. |
| Do | 33 29N. | 158 58E. | 24 | 2a, 25 | 25 | 1,009.1 | N. | N, 8 | N. | N, 9 | None. |
| Do | 40 18N. | 138 00W. | 24 | 6a, 25 | 25 | [3] 984.4 | SW. | SW, 8 | SW. | SW, 8 | |
| Do | 39 30N. | 155 12W. | 25 | 4p, 26 | 26 | 1,005.1 | S. | S, 8 | SSW. | S, 9 | |

[1] September. [2] Position approximate. [3] Barometer uncorrected.

## WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

*Atmospheric pressure.*—Over the greater part of the ocean from which readings are available for October 1941, the mean pressure was practically normal. The region of greatest departure was in the Gulf of Alaska, where considerable cyclonic activity occurred. At Juneau, with a mean barometer of 1,007.1 millibars (29.74 inches), the pressure was 4.4 millibars (.13 inch) below the normal of the month. The lowest barometer reading reported for October was 948.2 millibars (28.00 inches) read on a ship in the central Gulf of Alaska on the 16th.

There was much anticyclonic activity on the east-central part of the ocean, and the average HIGH extended from the Washington coast southwestward across Midway Island.

In southwestern waters, the island of Guam had an unusually low mean barometer for a tropical station in October. The average was 1,007.2 millibars (29.74

inches), which is 3.3 millibars (.10 inch) below the normal.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Pacific Ocean and its shores October 1941*

| Station | Average pressure | Departure from normal | Highest | Date | Lowest | Date |
|---|---|---|---|---|---|---|
| | *Millibars* | *Millibars* | *Millibars* | | *Millibars* | |
| Barrow | 1,010.3 | −3.2 | 1,032 | 27 | 998 | 5 |
| Dutch Harbor | 1,005.0 | +.9 | 1,028 | 21 | 976 | 16 |
| St. Paul | 1,004.3 | −.9 | 1,028 | 21 | 990 | 31 |
| Juneau | 1,007.1 | −4.4 | 1,025 | 27 | 982 | 17 |
| Tatoosh Island | 1,016.9 | +.6 | 1,028 | 2 | 1,002 | 11 |
| San Francisco | 1,015.2 | −1.1 | 1,025 | 30 | 1,004 | 4 |
| Mazatlan | 1,011.2 | +.7 | 1,014 | 23 | 1,000 | 1 |
| Honolulu | 1,014.2 | −1.7 | 1,020 | 30 | 1,009 | 24 |
| Midway Island | 1,018.7 | +1.8 | 1,025 | 23 | 1,008 | 6 |
| Guam | 1,007.2 | −3.3 | 1,012 | 31 | 1,002 | 23 |
| Hong Kong | | | | | | |

NOTE.—All data based on available observations, departures compiled from best available normals related to times of observation, except Juneau, Tatoosh Island, San Francisco, and Honolulu.

*Cyclones and gales of the extratropics.*—Following an unusually quiet September, the weather on the North Pacific became much stormier in October. At the beginning of the month gales of force 8 occurred in several parts of the ocean in minor disturbances. Off the central California coast northwesterly winds of force 8 were observed on the 1st and 2d. In the Okhotsk Sea a westerly gale of force 8 was reported on the 3d in connection with a cyclone of that region. Along the northern routes scattered gales of like intensity were experienced from the 1st to 4th. On the 8th and 9th fresh gales occurred in a disturbed area off the coast of Washington.

The period from the 12th to the 19th was one of considerable activity over the northeastern part of the ocean, while a cyclone of great intensity was central over and near the Gulf of Alaska. As early as the 12th one vessel encountered a wind of force 11 near 58° N., 149° W., with barometer down to 997 millibars (28.85 inches). On the 14th two ships, one near 51° N., 139° W., and the other near 50° N., 157° W., had southwesterly gales of force 9, with low barometers, as the storm spread southward. On the 15th and 16th scattered gales of force 8 to 12 occurred over a wide area from the coast of southeastern Alaska to a great distance seaward. One vessel, near 48° N., 151° W., at time of lowest barometer on the 16th, reported encountering southwesterly force-10 gales throughout about a 24 hour period. Another ship reported hurricane velocities at both a. m. and p. m. observations, near 48° N., 157° W. On the 16th to 18th, barometers were very low in the central Gulf of Alaska. A ship near 53° N., 148° W., on the 16th, had a low reading of 948.2 millibars (28 inches), with a southwesterly gale of force 10 that continued well into the 17th. Another ship on the 18th, near 56 °N., 145° W., had almost as low a barometer, with a northeasterly gale of force 10. On the 19th, south of Kodiak, a force-9 gale was reported.

The farthest southward spread of the storm, so far as covered by gale reports, was near 44° N., 134° W., where a force 8 wind was experienced, with only small depression of the barometer on the 18th. The farthest westward extent of the cyclone, at its time of most extensive development, was near the 180th meridian, where a ship in 42° north latitude had westerly gales of force 9 to 11 on the 15th and 16th.

From about the 23d to 25th an elongated low-pressure area extended north and south between approximately 25° and 50° N., 135° and 150° W. Scattered gale winds occurred within its boundary, but the most important was one of force 10 from the north, encountered near 27° N., 149° W., on the 23d.

*Typhoons.*—Subjoined is a report, by the Reverend Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., of a depression of October 18–23, and of a typhoon of October 22–November 2, which occurred in the Far East.

In addition to the foregoing, ships' reports indicate the existence of another typhoon which occurred well to the eastward of the Ogasawara (Bonin) Islands from at least the 11th to the 14th. Our earliest reports concerning its intensity came from a ship near 24° N., 155°–156° E., on the 11th and 12th. The highest wind force was 10, from northeast, lowest barometer 993.3 millibars (29.33 inches). To the northwestward ships reported fresh northeasterly gales on the 12th, and on the 14th a vessel rode through a south gale of force 10 near 33° N., 158° E. The cyclone is thus seen to have been moving northward well out at sea.

*Tehuantepecers.*—The only norther gale reported in the Gulf of Tehuantepec was one of force 8, on the 13th.

*Fog.*—Very few instances of fog are found in ships' observations over the open Pacific. It was reported on 2 days off the Washington coast, on 1 day off Oregon, on 5 days off California, and on 3 days off the upper coast of Lower California.

## TYPHOONS AND DEPRESSIONS OVER THE FAR EAST

BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

*Depression, October 18–23, 1941.*—About half way between Yap and Mindanao, a low pressure area became a depression, moving in a west-northwesterly direction on October 18 and 19. The afternoon and evening observations from stations near San Bernardino Strait indicated that the storm was intensifying, yet the morning of October 20 showed only a depression, central over Bondoc Peninsula, which had moved westerly across southern Luzon during the night. This weak center moved westerly into the China Sea. As a depression of minor importance, it moved northwest about 200 miles after leaving Verde Island Passage, then westerly to Indochina, where it disappeared.

Two lives were lost on Marinduque Island as this depression crossed the Archipelago. Considerable rain was reported from stations of southern Luzon and the Visayan Islands.

As this center was approaching southern Luzon, October 19, Virac, Catanduanes Island, reported 751.2 mm. (1,000.5 mb.), indicating that the storm was intensifying to typhoon strength. However, during the night, nothing lower than the above value was reported as the storm center moved across the Archipelago.

The upper winds over Zamboanga and Cebu changed from east quadrant to southwest quadrant on October 16. Almost at the same time, a mild surge from the east quadrant appeared over Guam. As the depression center came into existence, Zamboanga and Cebu velocities were weak, but directions showed a tendency to shift to the northwest quadrant. This tendency also appeared in the directions of the lower clouds over stations of the Visayan Islands. Because of these weak velocities and the movement of cool air from northern regions around the regions south of the center into the weak southwesterly air stream, there was no development. Velocities of the upper winds over Cebu and Zamboanga reached values of 50 and 60 k. p. h. only on October 20, when the depression center was moving toward Verde Island Passage. Other

days, values were below 40 k. p. h. Indications that the southwesterly air stream was weak over southern Indochina and Thailand were shown by the scattered reports received from these regions.

*Typhoon, October 22–November 2, 1941.*—As well as can be determined from available data, this typhoon seems to have formed far to the southeast or south-southeast of Guam. On October 22, a definite center, quite intense, seemed to be located about 300 miles south-southeast of Guam, and its movement was in a north-northwesterly direction. From October 23 to 25, this typhoon moved northerly along a course about 120 miles east of Guam. The next 3 days the center seemed to be close to and east of the northern Mariana Islands, stationary perhaps, or moving slowly in various directions. October 28 to 31 it moved west-northwest to the ocean regions about 300 miles southwest of the Bonin Islands. It either disappeared over those regions or moved about 500 miles to the east as a low pressure area (October 31 to November 2), after which no trace of the storm could be found.

The upper winds over Guam from October 17 onward were from the northeast and east quadrants, the velocities never exceeding 47 k. p. h., and mostly between 5 and 30 k. p. h. On October 21, the winds were backing to the north-northeast, velocities being less than 40 k. p. h. On October 22 and the two following days, the directions were from the north-northwest and north, with velocities ranging from 15 to 67 k. p. h. October 25 and the following days, Guam was under the influence of air streams from the west and southwest quadrants, with velocities less than 40 k. p. h. Stations over the Philippines were reporting directions from the northeast, east, and southeast quadrants during these days, with no evidence that the southwest monsoon air stream was present over the Archipelago.

After October 19, no ships' observations were on hand. The above account of the origin and course of the typhoon, especially after October 24, may have to be altered when observations from ships become available later.

## RIVER STAGES AND FLOODS

By BENNETT SWENSON

The month of October was marked by continued drought conditions in the East and by floods in a belt extending from New Mexico and Texas northeastward to Illinois and Wisconsin. The floods were especially severe in the three states, Kansas, Oklahoma, and Missouri, and some adjacent areas, with unusually high stages in the Kansas, Neosho, Verdigris, Cimarron, Washita, North Canadian, Canadian, and Arkansas Rivers and their tributaries in Kansas, Oklahoma, and Arkansas and in the Osage River in Missouri. The floods were the highest observed in parts of the Smoky Hill, Osage, Verdigris, Neosho, and North Canadian Rivers, and the Arkansas River was rising to unprecedented heights in the vicinity of Fort Smith at the close of the month. The resulting property damage was extensive.

*Atlantic Slope and East Gulf of Mexico drainage.*—River stages remained unusually low with only a slight improvement in a few areas. Precipitation since the first of the year in all of the states in the drainage was well below normal. In the Middle Atlantic States the precipitation for the two months, September and October, has been especially scanty; New Jersey, Maryland, and Virginia had the least rainfall of record for these 2 months.

*Upper Mississippi Basin and St. Lawrence drainage.*—Precipitation was well above normal in most of this area and river stages were high. Flood stages were reached or exceeded, however, only in the Wisconsin, Rock, Des Moines and Illinois Rivers, and in the Mississippi proper from Quincy, Ill., to Grafton, Ill., during the month, with no appreciable damage.

The Wisconsin River rose to slightly above flood stage on October 8 and again on the 28th at Knowlton, Wis.

Heavy rains in the lower Des Moines River Basin, on the 8th, together with rises in the river from heavy rains upstream several days previously, resulted in some overflow in the lower reaches. The river reached 15.8 feet (0.8 foot above flood stage) at Eddyville, Iowa, on the 9th.

The Rock River showed two rises during the month, exceeding flood stage by 0.3 and 0.6 foot, respectively, on the 11th and the 25th at Moline, Ill. The Illinois River similarly experienced two rises during approximately the same periods to moderately high flood stages.

Heavy discharge from the tributaries of the Mississippi River resulted in slight overflows in the main channel from Quincy to Grafton, Ill. These high stages, together with the flood waters from the Missouri River, were expected to cause some flooding in the Mississippi below the Missouri junction, but failed to materialize due to the low stage in the Ohio River which permitted a rapid run-off in the Mississippi.

*Ohio River Basin.*—Stages remained unusually low generally throughout the Basin. The mean stage at Cairo, Ill., 22.5 feet, was high as compared to the October normal of 11.1 feet, but represented the stage of the Mississippi rather than the Ohio River.

*Missouri and Arkansas River Basins.*—Much of the month was characterized by the presence of a large anticyclone over the southeastern United States, producing a strong inflow of moist tropical air over the southern and central plains states. Frequent outbreaks of cold air resulted in heavy downpours over Iowa, Kansas, Oklahoma, Missouri, and parts of Arkansas and Texas. It was the wettest October of record in Kansas, Oklahoma and Missouri, with previous high records exceeded by large amounts in some cases; Missouri had 43 percent more rainfall than for any previous October and Kansas 50 percent more than heretofore recorded.

Floods have been the rule, rather than the exception, in the Kansas and Neosho River Basins this year from April to October, as is shown in table 1. Flood stage has been reached or exceeded in these basins every month during this period except in May. The months of particularly severe flooding were June, September, and October. The highest stages of record have been established at a number of points during the 7-month period.

The official in charge, Topeka, Kans., reports as follows on the floods in the Topeka district (including the Kansas River Basin except the Republican River, and the Osage and Neosho Rivers in Kansas):

Overflows occurred in every river of the district during October 1941 and were especially severe along the Smoky Hill River, the upper reaches of the Neosho River, and the headwaters of the Cottonwood River. The Kansas River, which had never before been known to overflow later in the year than July, staged two distinct overflows from Manhattan to below Lawrence, Kans., during the month.

Three cities in the district—Salina, Council Grove, and Marion, Kans.—suffered very serious overflows, which in each case covered much of their areas. At Salina, where the Smoky Hill reached the highest stage since 1903, 700 homes were damaged and the flood loss was placed at $100,000. At Council Grove, where there was a flash flood due to torrential rains in the headwaters of the Neosho

River, the business section was flooded and, while no estimate of the damage in the town itself was available, the loss in the county, Morris County, was placed at $390,000. At Marion, where the business section and much of the residential section was inundated, the loss was severe, the damage for Marion County being placed at $593,000, much of which, of course, occurred in Marion itself.

Parts of the business and residential sections of Abilene were flooded, with damage to homes and business properties estimated at $50,000.

Total losses from these overflows in the district during the month was estimated at $6,523,150. The greater part of this loss was to matured crops, totaling, according to the estimates, $3,082,400. Damage to bridges and highways was estimated at $1,019,500, and to growing crops, $1,725,100.

The highest water reported in the district was along the Smoky Hill River, from some distance above Lindsborg, Kans., to its junction with the Republican River at Junction City, Kans. At Lindsborg the crest stage was 32.4 feet at midnight on October 20. This was 11.4 feet above bankful and has been exceeded only three times—in June 1938, in 1903, and in 1895. At Salina the crest was 24.25 feet at 2:10 p. m. of October 20. This was 4.25 feet above bankful and has been exceeded only once, in 1903, when the crest was 24.64 feet. At Enterprise the crest was 30.1 feet, 4.1 feet above bankful, at 7 a. m. of October 21, which has been exceeded only by the high water of 1903, the crest of which, from the best available sources, was 32.0 feet.

The Solomon River overflowed moderately twice during the month. The highest stage reached during the month was 26.3 feet, 8.3 feet above bankful, at Beloit, Kans., on the 10th. At Niles, Kans., the highest crest was 27.9 feet, 3.9 feet above bankful, on the 14th.

Both the Big Blue and Little Blue Rivers staged slight overflows, generally not more than one to four feet above bankful.

The Kansas River overflowed once at Ogden, Kans., where the crest stage was 20.7 feet, 2.7 feet above bankful, on the 22d. At Manhattan, Kans., it overflowed twice, with a crest of 21.2 feet, 4.2 feet above bankful, on the 10th, and of 21.8 feet, 4.8 feet above bankful, on the 23d. At Wamego, Kans., the first crest was 18.4 feet, 2.4 feet above bankful, on the 10th, and the second, 16.9 feet on the 23d. At Topeka the first crest was 24.6 feet, 3.6 feet above bankful, on the 10th, and the second crest was 24.3 feet on the 21st. At Lecompton, Kans., the first crest was 21.6, 4.6 feet above bankful, on the 11th, and the second crest, 20.8 feet on the 21st. At Lawrence, Kans., the overflows were slight. The first crest was 21.3 feet, 3.3 feet above bankful, on the 11th, and the second crest was 20.2 feet on the 21st.

The upper reaches of the Cottonwood River overflowed badly, but at Emporia, Kans., the overflow was only moderate. The first crest at that place was 23.35 feet, 3.35 feet above bankful, on the 15th, and the second crest was 25.0 feet on the 22d.

Damage along the Neosho River in Kansas, especially the lower reaches of the river, was prolonged and severe and generally occurred in two rather distinct floods—one near the middle of the month and one beginning about a week later. The highest point reached at Neosho Rapids was 28.1 feet, 6.1 feet above bankful, on the 21st. On the 15th Neosho Rapids reached a crest of 26.3 feet. At Le Roy a crest of 24.7 feet, 1.7 feet above bankful, was reached on the 17th, and a second crest of 26.5 feet occurred on the 23d. At Iola a crest of 16.3 feet, 1.3 feet above bankful, occurred on the 18th, and in the second overflow a crest of 20.0 feet was reached on the 26th. At Chanute there were two moderate overflows which crested on the 5th and 19th. These were followed by a crest of 27.2 feet, 7.2 feet above bankful, on the 28th. At Parsons there were three distinct crests—on the 6th, 17th, and 31st. The highest of these was on the 31st and was 27.4 feet, 5.4 feet above bankful. At that place the river was over its banks 14 days during the month. At Oswego the first crest was 23.65 feet, 6.65 feet above flood stage, on the 6th, and the second crest was 25.0 feet on the 31st, which is within 0.4 foot of the highest stage known at that place. The river at Oswego was over its banks on 22 days of the month and did not finally return to its banks until the 6th of the following November.

Two moderate overflows occurred along the Marais des Cygnes (Osage) River in Kansas. At Quenemo the highest crest reached was 35.4 feet, 5.4 feet above bankful, on the 22d. At La Cygne the crest was 28.4 feet, 3.4 feet above bankful, on the 25th. At Trading Post the highest point reached by the river was 26.2 feet, 2.2 feet above bankful on the 27th. At the latter place the river was over its banks on 19 days during the month.

Slight overflows occurred in the Republican River on October 9–10, but no appreciable damage resulted.

The Osage River, which was in moderate flood in the upper reaches during much of the month, reached record breaking stages in the lower portion, below Bagnell Dam, where exceptionally heavy rains occurred on October 5, At St. Thomas, Mo., a high stage of 34.5 feet was reached on the 7th, nearly 2 feet above the previous highest stage in 1935. A rise of 12 feet in 24 hours occurred in the Missouri River at Hermann, Mo., below its junction with the Osage. Such a rapid rise has occurred only three times at that place in the last 69 years.

The Grand River at Chillicothe, Mo., and below was in light flood; very little damage was experienced except in in the extreme lower reach from backwater of the Missouri River.

Heavy damage was sustained in Jefferson County, Kans., on October 21–22, by overflow in the Big Stranger Creek, especially near its mouth. Total damage has been estimated at $600,000.

A disastrous overflow occurred during the month in Cow Creek which empties into the Arkansas River at Hutchinson, Kans. This was caused by heavy rains which began in the upper watersheds of Cow Creek and the Little Arkansas on October 19, and continued at intervals until the 22d; the rains at the beginning of the period were especially heavy.

Upper Cow Creek began to flood immediately after the beginning of the rain on the 19th, the flood crest reaching Hutchinson on the 23d. That city, which had suffered from an even more disastrous flood in June 1929, when more than $2,000,000 damage occurred, was better prepared in this case, the Reno County engineer's office having set up a warning service after the flood of 1929. The damage from the recent flood in Hutchinson and vicinity has been estimated at $595,000, of which $144,800 was to farming interests and to roads and bridges outside of the city, $250,000 to private property in Hutchinson, and $200,200 to the city of Hutchinson.

Only a slight overflow occurred in the upper portion of the Little Arkansas, and the highest stage in the Arkansas River at Hutchinson during the rise in Cow Creek was 5.5 feet (0.5 foot below flood stage).

Extensive overflows occurred in the North and South Canadian Rivers, and in the Verdigris and Cimarron Rivers. The Verdigris River reached a stage of 42.0 feet at Sageeyah, Okla., on October 7, 7 feet above flood stage and 1.6 feet above the previous high stage of record in April 1929.

In the North Canadian River, the flooding was severe in the Yukon–Oklahoma City area; at Yukon, Okla., a stage of 17.0 feet was reached on October 28 and at Oklahoma City 14.7 feet was recorded on the 30th. These stages were the highest since the establishment of the gages at the two points.

The Arkansas River proper began flooding during the first week in October below the Kansas–Oklahoma line, followed by another pronounced rise near the middle of the month. The frequent rains during the month culminated on the 29–30th, when exceptionally heavy rains occurred over the lower Neosho, the North Canadian and the Arkansas River in Oklahoma. The Arkansas River rose to unprecedented heights in the vicinity of Fort Smith, reaching a stage of 37.3 feet on November 2–3. This stage exceeded the high stage of 36.7 feet at that place which occurred in April 1927.

*White River Basin.*—Heavy rains in Arkansas near the 15th of the month resulted in flood stages at Calico Rock and Batesville, Ark., on the upper White River.

*Red River Basin.*—Damaging floods occurred in the Washita River, particularly in the vicinity of Pauls Valley, Okla., late in the month. The only gaging stations maintained by the Bureau, which showed stages above flood stage were Ringo Crossing, Tex., on the Sulphur

River, where a stage of about 25.5 feet was reached on November 1, and at Arthur City, Tex., on the Red River, where a stage of 28.6 feet was reached on October 7.

*West Gulf of Mexico drainage.*—The city of Roswell, N. Mex., was still inundated on October 1, from the rise in the Rio Hondo which began there on September 28. The water receded early in October, the crest of this flood being higher than the rise which occurred the week previous, but no stage data are available at this writing.

The Pecos River rose to above flood stage in the irrigation district south of Red Bluff Dam on September 25 and remained above until October 16, a period of 22 days, as recorded on the gage at Pecos, Tex. The crest was reached on September 30, but the river receded very slowly after that date. Very little precipitation occurred during this period after September 29, except for moderate rains on October 3. The heavy flow in the river was maintained by the steady spilling of water over Red Bluff Dam, caused by overtaxed reservoirs in southeastern New Mexico.

The reservoirs were still full when moderate to heavy rains fell in southeastern New Mexico on October 22, 23, and 24, and conditions similar to those mentioned above developed. This time the Pecos River reached flood stage at Pecos, Tex., and remained above that stage until after the end of the month.

During the time of the highest stage of the first flood, it was estimated that 12,000 acres of farm land were under water in Reeves, Ward, and Loving Counties. The principal losses occurred during the first flood; the second one was characterized mostly by continued inconvenience.

No flooding occurred in the Rio Grande except in the lower portion. There the river exceeded flood stage slightly at Mercedes and Brownsville, Tex., from October 20 to 29.

*Gulf of California drainage.*—The following report is submitted by Official in Charge, Phoenix, Arix., relative to a flood in the upper Gila River above Coolidge Dam on September 29–30:

### FLOOD IN UPPER GILA RIVER, SEPTEMBER 1941

At 3 p. m., September 28, Kelvin, Ariz., reported a rainfall of 1.49 inches and a river stage of 6.6 feet, and river apparently still rising, indicating that a considerable amount of rain had fallen on parts of the upper Gila River Basin. At 5 p. m., the observer at Safford, Ariz., reported a small cloudburst (about one inch in an hour during the midafternoon) and that the river was running at the rate of approximately 10,000 second-feet at that time. Later a rainfall of 1.04 inches was telegraphed from Benson, Ariz. None of these reports indicated exceedingly heavy rains over the Gila watershed but did show that there had been a rather unusual development over southern Arizona.

During the afternoon of September 27, a peculiar cloud development began to take place and was of such a nature as to indicate the possibility of an inland movement over southern Arizona of some tropical disturbance, possibly from the Gulf of Lower California. Air of a very unstable nature began to move in rather rapidly; the instability being determined by frequent light rain of a type that is not ordinarily observed in this area. In the front of this development, for instance, it was noted that a fine rain appeared to be falling out of a practically clear sky at one time.

It was not until the morning of September 29, however, that there was any indication of the real intensity of the storm over the upper Gila Basin, and particularly in western New Mexico. Rodeo reported 3.21 inches for the 24-hour period ending at 5:30 a. m. and Mogollon, N. Mex., reported 2.86 inches. While there are times when these two reports might not reasonably indicate a general rain, the fact that the development was observed over southern Arizona prior to the rains gave some justification for assuming the general nature of this storm on the Gila Basin.

It is still not known exactly at what time the peak of the disastrous flood reached Duncan, but it seems to have been about 5 p. m. The town of Duncan was evacuated by about 3 p. m., according to all reports, and from reports no loss of life occurred.

The peak of this flow on the Gila reached Safford early in the morning of September 30, with a flow of something near 40,000 second-feet. This caused deep water over a considerable acreage of farmland and a small inhabited area, but the inhabitants were moved prior to the rise.

The losses, principally crops and real property, were as follows:

| | | |
|---|---|---|
| Greenlee County (Duncan area): | | |
| Loss of buildings and farm land | $200,000 | |
| Loss of crops | 84,500 | |
| Total | | $284,500 |
| Graham County (Safford area): Loss of farm land and crops | $200,000 | |
| Total | | 200,000 |
| Damage to highways, railroads, mines mostly in Greenlee County; total | | 15,500 |
| Grand total of all losses | | 500,000 |

TABLE 1.—*Flood stages in Kansas and Neosho River Basins, April to October, inclusive, 1941*

| River and Station | Flood stage | Highest stage reached in month of— | | | | | | Previous highest of record | |
|---|---|---|---|---|---|---|---|---|---|
| | | April | June | July | August | September | October | Stage | Year |
| Solomon River: Beloit, Kans. | 18 | ----- | 35.9 | ----- | ----- | 28.9 | 26.3 | 34.5 | 1935 |
| Saline River: Tescott, Kans. | 25 | ----- | 29.2 | ----- | ----- | 27.4 | 25.7 | ----- | ----- |
| Smoky Hill River: | | | | | | | | | |
| Ellsworth, Kans. | 20 | ----- | ----- | ----- | ----- | 21.35 | ----- | 27.2 | 1938 |
| Lindsborg, Kans. | 21 | ----- | 24.5 | ----- | 21.1 | 28.3 | 32.4 | 32.5 | 1938 |
| Salina, Kans. | 20 | ----- | 20.9 | ----- | ----- | 22.7 | 24.25 | 24.6 | 1903 |
| Enterprise, Kans. | 26 | ----- | 27.4 | ----- | ----- | 26.85 | 30.1 | 29.1 | 1935 |
| Republican River: | | | | | | | | | |
| Concordia, Kans. | 8 | ----- | 11.8 | 8.0 | ----- | 8.2 | ----- | 17.0 | 1935 |
| Clay Center, Kans. | 15 | ----- | 20.9 | ----- | ----- | 15.3 | ----- | 27.75 | 1935 |
| Little Blue River: Hanover, Kans. | 14 | ----- | 25.0 | ----- | ----- | 18.5 | 15.5 | ----- | ----- |
| Big Blue River: | | | | | | | | | |
| Beatrice, Nebr. | 16 | ----- | 22.15 | ----- | ----- | 26.3 | ----- | 26.0 | 1911 |
| Barnston, Nebr. | 20 | ----- | 39.5 | ----- | ----- | 28.6 | ----- | 34.0 | 1908 |
| Randolph, Kans. | 22 | ----- | 30.8 | ----- | ----- | 24.1 | 28.0 | 31.7 | 1903 |
| Kansas River: | | | | | | | | | |
| Ogden, Kans. | 18 | ----- | 20.7 | ----- | ----- | ----- | 20.7 | 28.5 | 1903 |
| Wamego, Kans. | 17 | ----- | 21.9 | ----- | ----- | ----- | 18.4 | 23.8 | 1935 |
| Topeka, Kans. | 21 | ----- | 25.8 | ----- | ----- | ----- | 24.6 | 28.0 | 1908 |
| Le Compton, Kans. | 16 | ----- | 21.0 | ----- | ----- | ----- | 21.6 | 29.5 | 1903 |
| Cottonwood River: Emporia, Kans. | 20 | ----- | 24.55 | ----- | 21.2 | 25.4 | 25.0 | 27.0 | 1928 |
| Neosho River: | | | | | | | | | |
| Neosho Rapids, Kans. | 22 | ----- | 25.8 | ----- | 24.7 | 23.7 | 28.1 | 28.0 | 1932 |
| LeRoy, Kans. | 23 | ----- | 28.5 | ----- | 24.8 | 23.9 | 26.5 | 29.6 | 1926 |
| Chanute, Kans. | 20 | ----- | 26.2 | ----- | ----- | 26.0 | 27.2 | 28.3 | 1928 |
| Oswego, Kans. | 17 | 22.3 | 21.9 | ----- | 17.0 | 23.0 | 25.0 | 25.4 | 1927 |
| Fort Gibson, Okla. | 22 | 33.5 | 27.25 | ----- | ----- | ----- | 35.5 | 35.0 | 1908 |

## FLOOD-STAGE REPORT, OCTOBER 1941

[All dates in October unless otherwise specified]

| River and station | Flood stage | Above flood stages—dates | | Crest | |
|---|---|---|---|---|---|
| | | From— | To— | Stage | Date |
| MISSISSIPPI SYSTEM | | | | | |
| *Upper Mississippi Basin* | | | | | |
| | *Feet* | | | *Feet* | |
| Wisconsin: Knowlton, Wis. | 12 | 8 | 8 | 12.8 | 8 |
| | | 28 | 28 | 12.1 | 28 |
| Rock: Moline, Ill. | 10 | 8 | 13 | 10.3 | 11 |
| | | 23 | 29 | 10.6 | 25-26 |
| Des Moines: Eddyville, Iowa | 15 | 9 | 10 | 15.8 | 9 |
| Illinois: | | | | | |
| Morris, Ill. | 13 | 7 | 8 | 13.7 | 8 |
| Peru, Ill. | 17 | 7 | 11 | 18.5 | 8 |
| Havana, Ill. | 14 | 10 | 21 | 15.5 | 15 |
| | | 23 | 23 | 14.0 | 23 |
| Beardstown, Ill. | 14 | 11 | 25 | 15.7 | 16 |
| Mississippi: | | | | | |
| Quincy, Ill. | 14 | 11 | 11 | 14.0 | 11 |
| Hannibal, Mo. | 13 | 10 | 13 | 14.1 | 11 |
| | | 14 | 15 | 13.1 | 15 |
| | | 25 | 28 | 13.2 | 26 |
| | | 2 | 5 | 12.9 | 4 |
| Louisiana, Mo. | 12 | (1) | (1) | 12.5 | 12 |
| | | | | 12.3 | 22 |
| | | | | 12.0 | 28 |
| Grafton, Ill. | 18 | 6 | 8 | 18.3 | 7 |

See footnotes at end of table.

## FLOOD-STAGE REPORT, OCTOBER 1941—Continued

| River and station | Flood stage | Above flood stages—dates | | Crest | |
|---|---|---|---|---|---|
| | | From— | To— | Stage | Date |
| **MISSISSIPPI SYSTEM—continued** | | | | | |
| *Missouri Basin* | | | | | |
| Solomon: | *Feet* | | | *Feet* | |
| Beloit, Kans. | 18 | 8 | 11 | 26.3 | 10 |
| | | 20 | 21 | 20.9 | 20 |
| Niles, Kans. | 24 | 11 | 15 | 27.9 | 14 |
| | | 23 | 23 | 24.4 | 23 |
| Saline: Tescott, Kans. | 25 | 22 | 22 | 25.7 | 22 |
| Smoky Hill: | | | | | |
| Lindsborg, Kans. | 21 | 19 | 23 | 32.4 | 20 |
| Salina, Kans. | 20 | 20 | 25 | 24.25 | 20 |
| Enterprise, Kans. | 26 | 20 | 27 | 30.1 | 21 |
| Republican: | | | | | |
| Clay Center, Kans. | 15 | 8 | 10 | 17.0 | 9 |
| Wakefield, Kans. | 11 | 9 | 10 | 12.5 | 9 |
| Junction City, Kans. | 10 | 9 | 10 | 11.2 | 9 |
| Little Blue: Hanover, Kans. | 14 | 9 | 9 | 15.5 | 9 |
| Big Blue: | | | | | |
| Barnston, Nebr. | 18 | 7 | 8 | 20.5 | 7 |
| Blue Rapids, Kans. | 20 | 9 | 9 | 21.9 | 9 |
| Randolph, Kans. | 22 | 9 | 10 | 28.0 | 9 |
| Kansas: | | | | | |
| Ogden, Kans. | 18 | 21 | 24 | 20.7 | 22 |
| Manhattan, Kans. | 17 | 10 | 11 | 21.2 | 10 |
| | | 21 | 25 | 21.8 | 23 |
| Wamego, Kans. | 17 | 9 | 11 | 18.4 | 10 |
| | | 23 | 24 | 16.9 | 23 |
| Topeka, Kans. | 21 | 10 | 11 | 24.6 | 10 |
| | | 20 | 22 | 24.5 | 21 |
| Lecompton, Kans. | 17 | 10 | 11 | 21.6 | 11 |
| | | 21 | 22 | 20.8 | 21 |
| Lawrence, Kans. | 18 | 10 | 11 | 21.3 | 11 |
| | | 21 | 21 | 20.2 | 21 |
| Bonner Springs, Kans. | 21 | 11 | 11 | 21.6 | 11 |
| | | 22 | 22 | 20.8 | 22 |
| Grand: | | | | | |
| Chillicothe, Mo. | 18 | 9 | 11 | 23.3 | 10 |
| Brunswick, Mo. | 12 | 10 | 14 | 14.5 | 12 |
| Osage: | | | | | |
| Quenemo, Kans. | 30 | 15 | 16 | 34.5 | 15 |
| | | 20 | 22 | 35.4 | 22 |
| Ottawa, Kans. | 24 | 15 | 17 | 27.5 | 16 |
| | | 20 | 23 | 30.5 | 22 |
| LaCygne, Kans. | 25 | 16 | 26 | 28.4 | 25 |
| Trading Post, Kans. | 24 | 5 | 8 | 24.8 | 6 |
| | | 10 | 10 | 24.0 | 10 |
| | | 16 | 29 | 26.2 | 27 |
| Osceola, Mo. | 20 | 4 | 16 | 29.2 | 8 |
| | | 29 | [2] | | |
| Lakeside, Mo. | 60 | 4 | 14 | 62.3 | 5-6 |
| | | 27 | 27 | 60.0 | 27 |
| | | 29 | [2] | | |
| St. Thomas, Mo. | 23 | 4 | 14 | 34.5 | 7 |
| | | 30 | [2] | | |
| Missouri: | | | | | |
| Waverly, Mo. | 18 | 12 | 12 | 18.2 | 12 |
| Hermann, Mo. | 21 | 5 | 15 | 25.8 | 6 |
| | | 31 | [2] | | |
| St. Charles, Mo. | 25 | 5 | 17 | 30.4 | 7 |
| | | 24 | 29 | 25.6 | 26 |
| | | 31 | [2] | | |
| *White Basin* | | | | | |
| White: | | | | | |
| Calico Rock, Ark. | 18 | 17 | 19 | 21.7 | 18 |
| Batesville, Ark. | 23 | 18 | 20 | 26.1 | 18 |
| *Arkansas Basin* | | | | | |
| Cimarron: Perkins, Okla. | 11 | 16 | 16 | 11.8 | 16 |
| | | 23 | 26 | 14.4 | 25 |
| Verdigris: | | | | | |
| Sageeyah, Okla. | 35 | 4 | 9 | 42.0 | 7 |
| | | 29 | [2] | | |
| Okay, Okla. | 27 | 31 | [2] | | |
| Cottonwood: Emporia, Kans. | 20 | 14 | 16 | 23.35 | 15 |
| | | 20 | 25 | 25.0 | 22 |

## FLOOD-STAGE REPORT, OCTOBER 1941—Continued

| River and station | Flood stage | Above flood stages—dates | | Crest | |
|---|---|---|---|---|---|
| | | From— | To— | Stage | Date |
| **MISSISSIPPI SYSTEM—continued** | | | | | |
| *Arkansas Basin*—Continued | | | | | |
| Neosho: | *Feet* | | | *Feet* | |
| Neosho Rapids, Kans. | 22 | 14 | 16 | 26.3 | 15 |
| | | 20 | 25 | 28.1 | 21 |
| LeRoy, Kans. | 23 | 15 | 18 | 24.7 | 17 |
| | | 20 | 27 | 26.5 | 23 |
| Iola, Kans. | 15 | 16 | 29 | 16.3 | 18 |
| | | 20 | 28 | 20.0 | 26 |
| Chanute, Kans. | 20 | 4 | 5 | 21.6 | 5 |
| | | 17 | 19 | 20.9 | 19 |
| | | 21 | 29 | 27.2 | 28 |
| Parsons, Kans. | 22 | 4 | 7 | 25.9 | 6 |
| | | 17 | 18 | 22.6 | 17 |
| | | 24 | [2] | 27.4 | 31 |
| Oswego, Kans. | 17 | 2 | 9 | 23.65 | 6 |
| | | 17 | [2] | | |
| Pensacola, Okla. | 24 | | | 27.0 | 6 |
| Fort Gibson, Okla. | 22 | 5 | 11 | 27.5 | 7 |
| | | 26 | 28 | 23.5 | 27 |
| | | 30 | [2] | | |
| North Canadian: | | | | | |
| Woodward, Okla. | 5 | 22 | 25 | 7.7 | 23 |
| Canton, Okla. | 9 | 23 | 28 | 12.6 | 25 |
| Yukon, Okla. | 8 | [3] | [3] | 10.6 | 7 |
| | | | | 17.0 | 28 |
| Oklahoma City, Okla. | 12 | 29 | 30 | 14.7 | 30 |
| East Oklahoma City, Okla. | 14 | 28 | [3] | 17.2 | 30 |
| Canadian: | | | | | |
| Canadian, Tex. | 5 | 1 | 2 | 5.9 | 2 |
| | | 22 | 22 | 6.0 | 22 |
| | | 24 | 24 | 6.0 | 24 |
| Union, Okla. | 6 | 2 | 2 | 6.6 | 2 |
| | | 23 | 25 | 8.0 | 24 |
| Arkansas: | | | | | |
| Arkansas City, Kans. | 15 | 24 | 27 | 16.35 | 26 |
| Webbers Falls, Okla. | 23 | 5 | 11 | 26.4 | 7-8 |
| | | 16 | 19 | 26.2 | 17 |
| | | 25 | [2] | | |
| Fort Smith, Ark. | 22 | 5 | 13 | 26.6 | 9 |
| | | 17 | 21 | 27.0 | 19 |
| | | 25 | [2] | | |
| Van Buren, Ark. | 22 | 5 | 12 | 26.0 | 9 |
| | | 17 | 21 | 26.4 | 19 |
| | | 25 | [2] | | |
| Dardanelle, Ark. | 22 | 8 | 11 | 22.9 | 10 |
| | | 18 | 21 | 23.4 | 20 |
| | | 28 | [2] | | |
| Morrilton, Ark. | 20 | 19 | 21 | 20.6 | 20 |
| | | 29 | [2] | | |
| *Red Basin* | | | | | |
| Sulphur: Ringo Crossing, Tex.[4] | 20 | 5 | 5 | 21.0 | 5 |
| | | 31 | [2] | | |
| Red: | | | | | |
| Arthur City, Tex. | 27 | 6 | 7 | 28.6 | 7 |
| Index, Ark. | 25 | 9 | 9 | 25.0 | 9 |
| **WEST GULF OF MEXICO DRAINAGE** | | | | | |
| Pecos: Pecos, Tex. | 13 | Sept. 25 | 16 | [5] 14.9+ | 30 |
| | | 25 | [2] | 14.1 | 28 |
| Rio Grande: | | | | | |
| Mercedes, Tex. | 21 | 20 | 29 | 22.1 | 24-25 |
| | | | | 22.0 | 28 |
| Brownsville, Tex. | 18 | 22 | 26 | 18.7 | 24-25 |

[1] Occasionally above flood stage during remainder of month due, in part, to operations of Dams Nos. 22 and 24.
[2] Continued into following month.
[3] Continued from preceding month.
[4] Gage out; stages estimated.
[5] Actual crest slightly higher, but gage was inaccessible due to flood water.

# CLIMATOLOGICAL DATA

## CONDENSED CLIMATOLOGICAL SUMMARY OF TEMERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January, p. 31]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

| Section | Temperature | | | | | | | | Precipitation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Monthly extremes | | | | | | | | Greatest monthly | | Least monthly | |
| | Section average | Departure from the normal | Station | Highest | Date | Station | Lowest | Date | Section average | Departure from the normal | Station | Amount | Station | Amount |
| | °F. | °F. | | °F. | | | °F. | | In. | In. | | In. | | In. |
| Alabama | 72.0 | +7.2 | Wetumpka | 98 | [1]8 | Valley Head | 34 | 25 | 2.14 | −0.88 | Addison | 6.45 | 2 stations | 0.00 |
| Arizona | 58.2 | −3.4 | 2 stations | 102 | 1 | Fort Valley | 12 | [1]29 | 1.55 | +.70 | Yaeger Canyon | 5.16 | do | .00 |
| Arkansas | 62.8 | +5.4 | do | 96 | [1]1 | 3 stations | 28 | 28 | 8.11 | +4.91 | Gravette | 15.18 | Nashville | 2.87 |
| California | 57.9 | −2.5 | Brawley | 104 | 1 | Ellery Lake | 8 | 28 | 1.56 | +.31 | Avalon | 8.12 | Haiwee | .28 |
| Colorado | 46.9 | .0 | Lamar | 88 | 12 | Pearl | −4 | 31 | 3.01 | +1.83 | Rico | 10.12 | Wiggins (near) | .08 |
| Florida | 77.5 | +4.4 | 7 stations | 98 | [1]9 | Vernon | 41 | 26 | 5.46 | +1.25 | St. Augustine | 16.72 | Fort Myers | .96 |
| Georgia | 71.4 | +6.4 | Tallapoosa | 99 | 6 | Blairsville | 28 | 25 | 2.32 | −.37 | Cordele | 8.56 | Atlanta No. 2 | .44 |
| Idaho | 45.9 | −1.2 | Glenns Ferry | 83 | 16 | 3 stations | 9 | [1]5 | 1.55 | +.05 | Roland | 4.90 | Sugar | .22 |
| Illinois | 59.2 | +3.4 | McLeansboro | 97 | 6 | Sycamore | 21 | 28 | 9.14 | +6.44 | Galesburg | 16.56 | Galena | 2.78 |
| Indiana | 59.0 | +4.0 | 2 stations | 94 | 6 | 2 stations | 24 | 29 | 6.86 | +4.03 | La Porte | 16.61 | Evans Landing | 3.95 |
| Iowa | 54.5 | +2.8 | 4 stations | 84 | [1]6 | Sibley | 15 | 28 | 6.11 | +3.72 | Burlington | 15.10 | Alton | 2.25 |
| Kansas | 58.4 | +1.1 | Ashland | 95 | 13 | St. Francis | 20 | 31 | 6.51 | +4.54 | Lindsborg | 16.01 | Norton | .51 |
| Kentucky | 64.0 | +5.6 | Russellville | 98 | 6 | 2 stations | 27 | [1]25 | 4.25 | +1.55 | Mayfield | 7.18 | Smith's Grove | 1.84 |
| Louisiana | 75.1 | +6.5 | Grand Coteau | 98 | 8 | Arcadia | 43 | 31 | 6.63 | +3.30 | Calhoun | 13.10 | Melville | 2.36 |
| Maryland-Delaware | 62.1 | +5.8 | 4 stations | 99 | [1]5 | Oakland, Md | 20 | 26 | 1.64 | −1.33 | Sines, Md | 4.53 | Cumberland, Md | .69 |
| Michigan | 50.2 | +1.7 | Monroe | 89 | 7 | Kenton | 16 | 25 | 5.80 | +2.95 | Eau Claire | 12.76 | Detour | 1.96 |
| Minnesota | 47.8 | +1.3 | Milan | 80 | 12 | Hallock | 8 | 30 | 3.23 | +1.34 | Albert Lea | 7.42 | Ah-gwah-ching | .63 |
| Mississippi | 72.4 | +6.9 | Kosciusko | 97 | 1 | 4 stations | 38 | 29 | 4.92 | +2.30 | Scott | 11.27 | Waynesboro | .75 |
| Missouri | 61.6 | +3.9 | Sikeston | 92 | 6 | 2 stations | 20 | [1]28 | 10.14 | +7.17 | Joplin | 16.67 | St. Louis University | 4.60 |
| Montana | 43.5 | −1.4 | 3 stations | 79 | 12 | West Yellowstone | −1 | 30 | 1.00 | −.07 | Haugan | 3.34 | Cut Bank | .07 |
| Nebraska | 52.4 | +.7 | Kearney | 87 | 12 | Box Butte Exp. Farm. | 12 | 31 | 1.88 | +.41 | Pawnee City | 10.48 | 2 stations | .37 |
| Nevada | 48.6 | −1.9 | Overton | 105 | 6 | Seventy One Ranch | 9 | 15 | 1.66 | +1.06 | Lehman Caves Nat'l Mon. | 3.88 | Jarbidge | .46 |
| New England | 49.6 | +.2 | 4 stations | 90 | 5 | First Conn. Lake, N. H. | 9 | 26 | 2.99 | −.51 | Searsburg Mountain, Vt. | 6.68 | Providence, R. I. | 1.07 |
| New Jersey | 58.9 | +4.3 | 2 stations | 97 | [1]5 | Runyon | 17 | 29 | 1.90 | −1.71 | Hammonton | 3.49 | New Brunswick | 1.15 |
| New Mexico | 53.1 | −.6 | Carlsbad | 94 | 13 | Irvin's Ranch | 11 | [1]30 | 3.10 | +1.94 | Obar | 8.02 | Rodeo Airport | .45 |
| New York | 52.1 | +2.2 | Bedford Hill | 97 | 5 | Lake Placid Club | 8 | 26 | 3.75 | +.46 | Trenton Falls | 8.26 | Cairo | .78 |
| North Carolina | 66.3 | +6.2 | Louisburg | 100 | 6 | Banners Elk | 22 | 25 | 1.67 | −1.61 | Highlands | 4.09 | Rougemont | .33 |
| North Dakota | 44.5 | +.6 | Mohall | 81 | 16 | Langdon | 0 | 30 | 1.32 | +.30 | Powers Lake | 2.42 | Howard | .15 |
| Ohio | 58.3 | +4.7 | 3 stations | 93 | [1]6 | 2 stations | 23 | 29 | 4.73 | +2.17 | West Manchester | 8.18 | Beverly | 1.65 |
| Oklahoma | 64.7 | +2.1 | Fort Supply Dam | 95 | 13 | Boise City | 26 | 31 | 11.47 | +8.41 | Pensacola | 22.66 | Kenton | 3.91 |
| Oregon | 48.7 | −1.0 | 2 stations | 83 | [1]3 | Fremont | 12 | 8 | 2.03 | +.11 | McNamurs | 7.35 | Hermiston | .32 |
| Pennsylvania | 57.0 | +4.4 | Phoenixville | 100 | 5 | Lawrenceville | 19 | [1]17 | 2.76 | −.45 | Kane | 6.87 | Holtwood | .75 |
| South Carolina | 70.5 | +6.7 | 3 stations | 98 | [1]1 | 2 stations | 34 | [1]25 | 1.83 | −1.09 | Blackville | 4.90 | Pinopolis | .18 |
| South Dakota | 48.6 | −.1 | 2 stations | 88 | [1]3 | do | 8 | 31 | 2.17 | +.99 | Gregory | 5.56 | Ralph | .39 |
| Tennessee | 66.9 | +7.1 | Bolivar | 97 | 1 | Rugby | 28 | 25 | 3.68 | +.84 | Selmar | 8.80 | Elizabethton | 1.19 |
| Texas | 71.9 | +4.2 | Seguin | 103 | 6 | Stratford | 28 | 31 | 6.21 | +3.45 | Goose Creek | 16.27 | Laredo | .14 |
| Utah | 47.0 | −2.0 | Toquerville | 90 | 9 | Kimberly | 8 | 22 | 3.32 | +2.17 | Clear Creek | 7.66 | Standrod (near) | .51 |
| Virginia | 63.9 | +6.5 | Walkerton | 101 | 6 | 2 stations | 22 | 29 | 1.12 | −1.83 | Pennington Gap | 2.97 | Moores Creek Dam | .12 |
| Washington | 49.6 | .0 | 2 stations | 80 | [1]18 | do | 18 | [1]29 | 2.74 | −.34 | Big Four | 19.05 | Pateros | .07 |
| West Virginia | 59.6 | +4.9 | Inwood | 99 | 5 | Seneca State Forest | 17 | 29 | 2.89 | +.03 | Pickens | 6.20 | Berkeley Springs | .40 |
| Wisconsin | 49.7 | +1.4 | 2 stations | 79 | [1]3 | Merrill | 14 | 28 | 4.67 | +2.19 | Eau Claire | 7.82 | Superior | 1.83 |
| Wyoming | 42.3 | −1.3 | Yoder | 86 | 20 | Hunter's Station | −6 | 30 | 1.28 | +.20 | Lyman | 3.38 | Lavier | .22 |
| Alaska (Sept.) | 45.5 | +1.7 | Nenana | 79 | 5 | Coal Creek | 2 | 21 | 2.21 | −1.33 | Ketchikan | 13.68 | Eklutna (near) | .33 |
| Hawaii | 74.2 | +.7 | Mahukona | 94 | [1]8 | Haleakala | 32 | [1]12 | 14.74 | +9.33 | Puohakamoa No. 2 | 56.30 | Waimea | 1.08 |
| Puerto Rico | 78.2 | +.3 | 2 stations | 96 | 4 | Guineo Reservoir | 55 | 9 | 5.90 | −1.99 | La Mina (El Yunque). | 12.54 | Josefa | 1.18 |

[1] Other dates also.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

| District and station | Elevation of instruments: Barometer above sea level | Thermometer above ground | Anemometer above ground | Pressure: Station, reduced to mean of 24 hours | Sea level, reduced to mean of 24 hours | Departure from normal | Temperature of the air: Mean max.+mean min.÷2 | Departure from normal | Maximum | Date | Mean maximum | Minimum | Date | Mean minimum | Greatest daily range | Mean wet thermometer | Mean temperature of the dew-point | Mean relative humidity | Precipitation: Total | Departure from normal | Days with 0.01 inch, or more | Wind: Average hourly velocity | Prevailing direction | Maximum velocity: Miles per hour | Direction | Date | Clear days | Partly cloudy days | Cloudy days | Average cloudiness, tenths | Total snowfall | Snow, sleet, and ice on ground at end of month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *New England* | *Ft.* | *Ft.* | *Ft.* | *In.* | *In.* | *In.* | *° F.* | *° F.* | *° F.* | | *° F.* | *° F.* | | *° F.* | *° F.* | *° F.* | *° F.* | *%* | *In.* | *In.* | | *Miles* | | | | | | | | *0-10* | *In.* | *In.* |
| | | | | | | | 50.5 | +0.3 | | | | | | | | | | 76 | 2.47 | −0.8 | | | | | | | | | | 6.0 | | |
| Eastport | 75 | 67 | 85 | 29.89 | 29.97 | −0.03 | 46.6 | −0.9 | 70 | 4 | 54 | 26 | 29 | 40 | 27 | 44 | 40 | 81 | 4.38 | +.8 | 18 | 10.6 | nw. | 33 | w. | 23 | 10 | 6 | 15 | 5.8 | T | 0.0 |
| Greenville, Maine | 1,070 | 6 | 41 | 28.81 | 29.99 | ..... | 41.7 | −3.2 | 66 | 4 | 52 | 14 | 30 | 32 | 39 | 39 | 35 | ... | 2.97 | ..... | 15 | ..... | nw. | ..... | ..... | ..... | ... | 5 | 7 | 19 | ..... | 1.7 | .0 |
| Portland, Maine [1] | 103 | 5 | 36 | 29.89 | 30.01 | −.03 | 48.2 | ..... | 82 | 4 | 59 | 22 | 26 | 38 | 38 | 44 | 39 | 76 | 2.13 | −1.0 | 12 | 8.8 | w. | 34 | nw. | 23 | 10 | 8 | 13 | 5.6 | T | .0 |
| Concord [2] | 289 | 54 | 72 | 29.71 | 30.03 | −.02 | 47.8 | −1.9 | 81 | 4 | 60 | 18 | 26 | 36 | 42 | 43 | 39 | 77 | 1.66 | −1.2 | 16 | 7.7 | nw. | 34 | nw. | 23 | 7 | 11 | 13 | 6.1 | T | .0 |
| Burlington [2] | 403 | 11 | 48 | 29.59 | 30.03 | −.01 | 47.0 | −2.2 | 79 | 5 | 56 | 19 | 26 | 38 | 32 | 43 | 39 | 78 | 1.99 | −1.0 | 17 | 10.7 | s. | 38 | s. | 27 | 3 | 7 | 21 | 7.8 | T | .0 |
| Northfield | 876 | 12 | 60 | 29.08 | 30.05 | +.01 | 45.7 | +.2 | 80 | 5 | 57 | 16 | 26 | 34 | 40 | ... | ... | ... | 2.96 | +.1 | 17 | 8.7 | sw. | 29 | s. | 27 | 4 | 9 | 18 | 7.5 | .0 | .0 |
| Boston [1] | 124 | 33 | 62 | 29.91 | 30.04 | −.01 | 55.9 | ..... | 84 | 4 | 65 | 29 | 26 | 47 | 31 | 49 | 43 | 67 | 1.92 | −1.2 | 12 | 11.4 | nw. | 38 | nw. | 23 | 9 | 6 | 16 | 6.3 | T | .0 |
| Nantucket | 12 | 10 | 63 | 30.05 | 30.06 | +.01 | 55.8 | +1.6 | 82 | 6 | 62 | 38 | 26 | 49 | 29 | 51 | 48 | 77 | 3.80 | +.4 | 9 | 11.9 | sw. | 29 | sw. | 23 | 12 | 8 | 11 | 5.6 | .0 | .0 |
| Block Island | 26 | 11 | 46 | 30.04 | 30.07 | +.02 | 56.5 | +1.6 | 79 | 6 | 62 | 36 | 29 | 50 | 22 | 52 | 48 | 75 | 2.56 | −1.0 | 13 | 16.3 | sw. | 45 | nw. | 23 | 14 | 6 | 11 | 4.5 | .0 | .0 |
| Providence [2] | 159 | 65 | 74 | 29.89 | 30.06 | +.01 | 56.4 | +4.2 | 85 | 5 | 66 | 31 | 26 | 47 | 31 | 49 | 45 | 74 | 1.07 | −2.0 | 8 | 7.0 | sw. | 25 | sw. | 23 | 10 | 8 | 13 | 5.0 | .0 | .0 |
| Hartford [1] | 159 | 5 | 44 | 29.89 | 30.06 | .00 | 54.7 | ..... | 88 | 5 | 66 | 29 | 17 | 43 | 35 | 49 | 45 | 77 | 1.95 | −1.6 | 11 | 8.5 | sw. | 34 | nw. | 23 | 7 | 12 | 12 | 6.1 | .0 | .0 |
| New Haven [2] | 107 | 74 | 153 | 29.96 | 30.08 | +.02 | 57.4 | +3.6 | 87 | 6 | 66 | 34 | 29 | 49 | 28 | 52 | 48 | 78 | 2.77 | −.9 | 13 | 8.4 | sw. | 26 | s. | 27 | 11 | 8 | 12 | 5.4 | .0 | .0 |
| *Middle Atlantic States* | | | | | | | 62.0 | +5.6 | | | | | | | | | | 71 | 1.63 | −1.4 | | | | | | | | | | 5.6 | | |
| Albany [1] | 97 | 26 | 40 | 29.95 | 30.06 | .00 | 51.4 | ..... | 91 | 5 | 61 | 25 | 26 | 42 | 33 | 46 | 42 | 76 | 1.80 | −.9 | 13 | 10.0 | s. | 34 | w. | 23 | 5 | 12 | 14 | 6.8 | .0 | .0 |
| Binghamton | 871 | 57 | 79 | 29.16 | 30.10 | +.04 | 54.5 | +4.5 | 87 | 5 | 64 | 27 | 17 | 45 | 37 | 48 | 44 | 73 | 2.47 | −.5 | 15 | 5.8 | w. | 21 | w. | 10 | 2 | 10 | 19 | 7.9 | T | .0 |
| New York | 314 | 415 | 454 | 29.74 | 30.08 | +.02 | 60.0 | +3.7 | 90 | 5 | 68 | 36 | 29 | 52 | 30 | 53 | 47 | 66 | 1.43 | −2.1 | 8 | 16.0 | nw. | 53 | nw. | 23 | 10 | 9 | 12 | 5.5 | .0 | .0 |
| Harrisburg [1] | 374 | 30 | 49 | 29.70 | 30.11 | +.03 | 59.8 | ..... | 97 | 7 | 71 | 32 | 30 | 49 | 37 | 52 | 46 | 69 | 1.49 | −1.4 | 10 | 7.4 | nw. | 34 | s. | 27 | 7 | 9 | 15 | 6.4 | .0 | .0 |
| Philadelphia [2] | 114 | 174 | 367 | 29.98 | 30.10 | +.03 | 62.8 | +5.0 | 94 | 5 | 72 | 36 | 29 | 54 | 29 | 54 | 50 | 74 | 1.10 | −1.7 | 8 | 12.4 | sw. | 34 | sw. | 27 | 11 | 10 | 10 | 5.1 | .0 | .0 |
| Reading | 323 | 47 | 306 | 29.76 | 30.11 | ..... | 60.2 | +4.7 | 94 | 5 | 70 | 32 | 29 | 50 | 32 | 52 | 47 | 68 | 2.15 | −1.0 | 8 | 10.8 | nw. | 35 | nw. | 10 | 8 | 12 | 11 | 5.6 | .0 | .0 |
| Scranton | 805 | 72 | 104 | 29.22 | 30.09 | +.02 | 56.4 | +4.5 | 89 | 5 | 66 | 32 | 17 | 47 | 30 | ... | ... | ... | 2.18 | −.8 | 14 | 6.9 | sw. | 28 | sw. | 10 | 8 | 13 | 10 | 6.0 | .0 | .0 |
| Atlantic City | 52 | 37 | 172 | 30.04 | 30.10 | +.03 | 62.2 | +5.3 | 91 | 6 | 70 | 36 | 29 | 55 | 30 | 56 | 52 | 73 | 1.57 | −1.6 | 7 | 15.1 | sw. | 40 | s. | 27 | 12 | 11 | 8 | 4.9 | .0 | .0 |
| Trenton | 190 | 89 | 107 | 29.89 | 30.10 | ..... | 60.4 | +4.8 | 94 | 5 | 70 | 33 | 29 | 51 | 32 | 53 | 48 | 69 | 1.58 | −1.2 | 9 | 8.4 | s. | 30 | sw. | 14 | 9 | 10 | 12 | 5.5 | .0 | .0 |
| Baltimore [2] | 123 | 100 | 215 | 29.98 | 30.11 | +.03 | 65.1 | +6.9 | 97 | 5 | 74 | 36 | 29 | 56 | 28 | 55 | 50 | 70 | .99 | −1.9 | 8 | 9.6 | sw. | 32 | nw. | 1 | 10 | 9 | 12 | 5.6 | .0 | .0 |
| Washington [2] | 112 | 62 | 85 | 30.00 | 30.12 | +.04 | 64.4 | +7.0 | 96 | 5 | 74 | 35 | 29 | 55 | 33 | 56 | 50 | 68 | 1.08 | −1.8 | 7 | 5.8 | nw. | 24 | nw. | 10 | 12 | 11 | 8 | 5.0 | .0 | .0 |
| Cape Henry | 18 | 8 | 54 | 30.10 | 30.12 | ..... | 68.6 | +6.5 | 95 | 5 | 77 | 45 | 29 | 60 | 31 | 61 | 57 | 72 | 2.34 | −.7 | 3 | 12.1 | sw. | 42 | n. | 11 | 11 | 14 | 6 | 4.6 | .0 | .0 |
| Lynchburg | 686 | 144 | 184 | 29.41 | 30.15 | +.06 | 65.3 | +6.8 | 98 | 6 | 78 | 35 | 29 | 53 | 40 | 56 | 50 | 66 | 1.09 | −2.1 | 3 | 6.6 | sw. | 30 | nw. | 10 | 13 | 10 | 8 | 4.7 | .0 | .0 |
| Norfolk [2] | 91 | 80 | 125 | 30.04 | 30.14 | +.07 | 68.8 | +6.3 | 94 | 6 | 77 | 43 | 29 | 60 | 29 | 60 | 57 | 80 | 2.37 | −.7 | 3 | 9.6 | sw. | 27 | nw. | 23 | 11 | 9 | 11 | 5.2 | .0 | .0 |
| Richmond [2] | 144 | 11 | 52 | 29.97 | 30.13 | +.05 | 67.0 | +7.4 | 99 | 6 | 79 | 36 | 29 | 55 | 39 | 58 | 52 | 75 | .75 | −2.1 | 4 | 7.6 | sw. | 22 | w. | 23 | 13 | 9 | 9 | 4.3 | .0 | .0 |
| *South Atlantic States* | | | | | | | 71.4 | +7.0 | | | | | | | | | | 79 | 2.19 | −1.0 | | | | | | | | | | 5.0 | | |
| Asheville | 2,253 | 99 | 104 | 27.84 | 30.17 | +.08 | 63.0 | +7.7 | 90 | 5 | 74 | 34 | 26 | 52 | 41 | 54 | 50 | 74 | 1.35 | −1.4 | 7 | 7.1 | nw. | 23 | nw. | 10 | 9 | 10 | 12 | 5.6 | .0 | .0 |
| Charlotte [2] | 779 | 63 | 86 | 29.31 | 30.14 | +.06 | 69.3 | +7.6 | 94 | 6 | 80 | 42 | 30 | 58 | 33 | 58 | 53 | 71 | 2.08 | −.9 | 3 | 6.6 | s. | 21 | s. | 27 | 10 | 12 | 9 | 5.1 | .0 | .0 |
| Greensboro [1] | 886 | 6 | 56 | 29.22 | 30.16 | ..... | 65.4 | ..... | 94 | 6 | 79 | 30 | 25 | 52 | 45 | 56 | 52 | 74 | .44 | ..... | 3 | 7.3 | sw. | 25 | nw. | 10 | 10 | 8 | 13 | 5.5 | .0 | .0 |
| Hatteras | 11 | 5 | 50 | 30.12 | 30.13 | +.07 | 70.6 | +4.7 | 86 | 8 | 77 | 51 | 25 | 64 | 23 | 65 | 63 | 82 | .63 | −4.3 | 2 | 11.7 | sw. | 31 | nw. | 10 | 14 | 10 | 7 | 4.2 | .0 | .0 |
| Raleigh [1] | 376 | 27 | 69 | 29.75 | 30.15 | +.08 | 68.2 | ..... | 96 | 6 | 80 | 41 | 12 | 56 | 39 | 58 | 54 | 71 | 1.93 | −.9 | 3 | 8.5 | sw. | 24 | sw. | 27 | 9 | 14 | 8 | 4.8 | .0 | .0 |
| Wilmington | 72 | 73 | 107 | ..... | 30.14 | +.08 | 70.7 | +5.4 | 88 | 6 | 80 | 48 | 25 | 62 | 27 | ... | ... | 80 | .65 | −2.6 | 3 | 7.9 | ne. | 29 | nw. | 28 | 11 | 13 | 7 | ..... | .0 | .0 |
| Charleston [3] | 48 | 11 | 92 | 30.06 | 30.11 | +.05 | 73.8 | +6.0 | 89 | 10 | 80 | 57 | 30 | 67 | 20 | 64 | 63 | 90 | 2.55 | −.7 | 6 | 9.8 | ne. | 32 | se. | 8 | 8 | 13 | 10 | 5.5 | .0 | .0 |
| Columbia, S. C. [3] | 347 | 70 | 91 | 29.76 | 30.12 | +.05 | 72.2 | +7.9 | 94 | 5 | 83 | 49 | 30 | 62 | 30 | 63 | 60 | 79 | .98 | −1.6 | 4 | 7.9 | s. | 21 | sw. | 27 | 14 | 13 | 4 | 4.3 | .0 | .0 |
| Greenville, S. C. | 1,040 | 70 | 78 | 29.05 | 30.14 | ..... | 69.2 | +9.0 | 94 | 6 | 79 | 46 | 30 | 59 | 34 | ... | ... | ... | 1.07 | −2.0 | 4 | 6.4 | ne. | 20 | sw. | 27 | 16 | 7 | 8 | 4.5 | .0 | .0 |
| Augusta [2] | 182 | 62 | 77 | 29.92 | 30.12 | +.05 | 72.9 | +7.6 | 94 | 8 | 84 | 45 | 12 | 62 | 35 | 63 | 58 | 71 | 1.52 | −.9 | 5 | 5.1 | se. | 19 | sw. | 27 | 12 | 11 | 8 | 4.7 | .0 | .0 |
| Savannah [2] | 65 | 73 | 152 | 30.04 | 30.10 | +.05 | 75.8 | +7.9 | 94 | 5 | 84 | 56 | 12 | 68 | 26 | 67 | 65 | 86 | 2.36 | −.6 | 6 | 9.5 | se. | 34 | sw. | 8 | 11 | 9 | 11 | 5.3 | .0 | .0 |
| Jacksonville [2] | 43 | 86 | 110 | 30.04 | 30.08 | +.06 | 77.0 | +5.9 | 94 | 9 | 84 | 61 | 12 | 70 | 22 | 70 | 68 | 86 | 9.00 | +4.5 | 10 | 7.2 | e. | 23 | ne. | 11 | 9 | 13 | 9 | 5.5 | .0 | .0 |
| *Florida Peninsula* | | | | | | | 81.1 | +3.0 | | | | | | | | | | 84 | 3.37 | −2.5 | | | | | | | | | | 4.8 | | |
| Key West [2] | 21 | 10 | 64 | 29.99 | 30.01 | +.07 | 81.6 | +2.5 | 89 | 11 | 86 | 73 | 18 | 77 | 13 | 76 | 74 | 82 | 4.72 | −1.3 | 9 | 9.2 | e. | 27 | w. | 6 | 15 | 11 | 5 | 4.0 | .0 | .0 |
| Miami [2] | 25 | 124 | 168 | 29.99 | 30.02 | +.05 | 80.6 | +3.6 | 91 | 10 | 85 | 70 | 17 | 76 | 16 | 73 | 72 | 85 | 3.04 | −5.4 | 14 | 10.4 | e. | 63 | e. | 6 | 13 | 13 | 5 | 4.6 | .0 | .0 |
| Tampa [1] | 35 | 5 | 61 | 30.00 | 30.04 | +.06 | 79.4 | ..... | 95 | 9 | 87 | 65 | 17 | 72 | 21 | 73 | 71 | 86 | 2.34 | −.8 | 8 | 11.1 | e. | 37 | s. | 18 | 8 | 13 | 10 | 5.8 | .0 | .0 |
| *East Gulf States* | | | | | | | 74.0 | +6.9 | | | | | | | | | | 81 | 3.37 | +0.3 | | | | | | | | | | 5.0 | | |
| Atlanta [1] | 1,173 | 5 | 72 | 28.89 | 30.11 | +.04 | 69.6 | ..... | 91 | 9 | 80 | 44 | 12 | 59 | 35 | 60 | 56 | 72 | .57 | ..... | 3 | 8.4 | e. | 32 | nw. | 10 | 12 | 7 | 12 | 5.2 | .0 | .0 |
| Macon [2] | 370 | 79 | 87 | 29.71 | 30.10 | +.04 | 71.4 | +6.9 | 94 | 5 | 82 | 43 | 12 | 61 | 35 | 63 | 60 | 78 | 2.62 | +.3 | 5 | 6.3 | n. | 22 | sw. | 27 | 9 | 7 | 15 | 5.8 | .0 | .0 |
| Thomasville | 273 | 49 | 58 | 29.80 | 30.10 | +.06 | 74.4 | +6.2 | 94 | 9 | 85 | 53 | 29 | 64 | 30 | ... | ... | ... | 2.71 | ..... | 3 | ..... | ..... | ... | ..... | ... | ... | 6 | 12 | 13 | ..... | .0 | .0 |
| Apalachicola | 35 | 11 | 51 | 30.01 | 30.05 | ..... | 77.2 | +6.6 | 93 | 8 | 83 | 60 | 29 | 71 | 21 | 71 | 69 | 82 | 5.13 | +1.9 | 7 | 10.4 | ne. | 49 | nw. | 7 | 12 | 9 | 10 | 4.9 | .0 | .0 |
| Pensacola | 56 | 54 | 79 | 30.00 | 30.06 | +.03 | 76.2 | +6.3 | 93 | 8 | 84 | 52 | 29 | 69 | 24 | 69 | 67 | 79 | 2.30 | −1.9 | 7 | 8.2 | se. | 23 | se. | 2 | 15 | 11 | 5 | 4.4 | .0 | .0 |
| Anniston | 741 | 9 | ..... | ..... | ..... | ..... | 69.7 | +7.3 | 92 | 9 | 81 | 42 | 13 | 58 | 38 | ... | ... | ... | 2.28 | −.3 | 7 | ..... | se. | ... | ..... | ... | 11 | 17 | 3 | ..... | .0 | .0 |
| Birmingham [2] | 700 | 11 | 48 | 29.37 | 30.11 | +.04 | 72.0 | +7.2 | 94 | 6 | 82 | 45 | 29 | 62 | 31 | 62 | 59 | 81 | 3.43 | +1.0 | 6 | 6.7 | se. | 25 | se. | 31 | 13 | 9 | 9 | 4.8 | .0 | .0 |
| Mobile [2] | 57 | 86 | 161 | 30.00 | 30.06 | +.02 | 75.6 | +6.3 | 94 | 8 | 85 | 50 | 29 | 67 | 28 | 69 | 67 | 83 | 3.91 | +.3 | 6 | 8.4 | n. | 25 | e. | 13 | 8 | 17 | 6 | 5.0 | .0 | .0 |
| Montgomery [2] | 218 | 92 | 105 | 29.86 | 30.09 | +.03 | 74.0 | +7.4 | 94 | 9 | 84 | 48 | 29 | 64 | 31 | 64 | 61 | 76 | 1.10 | −1.4 | 4 | 6.4 | e. | 21 | sw. | 27 | 12 | 12 | 7 | 4.6 | .0 | .0 |
| Meridian [2] | 375 | 67 | 92 | 29.68 | 30.07 | +.01 | 72.2 | +7.9 | 92 | 8 | 83 | 47 | 12 | 62 | 34 | 65 | 63 | 84 | 3.24 | +.8 | 7 | 5.4 | s. | 18 | sw. | 31 | 15 | 8 | 10 | 4.9 | .0 | .0 |
| Vicksburg [2] | 247 | 82 | 102 | 29.79 | 30.05 | −.01 | 73.5 | +6.8 | 93 | 1 | 82 | 48 | 28 | 65 | 24 | 64 | 63 | 90 | 2.85 | +.1 | 10 | 8.0 | se. | 24 | sw. | 31 | 10 | 10 | 11 | 5.5 | .0 | .0 |
| New Orleans [2] | 53 | 76 | 84 | 29.99 | 30.04 | +.01 | 78.2 | +7.2 | 93 | 8 | 85 | 54 | 29 | 71 | 25 | 71 | 69 | 81 | 5.71 | +2.4 | 7 | 6.7 | se. | 19 | se. | 1 | 14 | 8 | 9 | 4.4 | .0 | .0 |
| *West Gulf States* | | | | | | | 73.3 | +5.6 | | | | | | | | | | 85 | 7.38 | +4.3 | | | | | | | | | | 6.7 | | |
| Shreveport [3] | 249 | 92 | 227 | 29.78 | 30.04 | −.01 | 73.1 | +6.5 | 93 | 4 | 83 | 44 | 31 | 64 | 27 | 66 | 64 | 85 | 8.50 | +5.8 | 11 | 9.8 | se. | 31 | w. | 26 | 7 | 11 | 13 | 6.0 | .0 | .0 |
| Bentonville | 1,303 | 12 | 51 | 28.68 | 30.04 | −.01 | 63.6 | +5.6 | 86 | 5 | 72 | 30 | 28 | 55 | 32 | ... | ... | ... | 12.95 | +9.3 | 17 | 6.9 | s. | 17 | s. | 4 | 4 | 9 | 18 | 8.0 | .0 | .0 |
| Fort Smith | 463 | 57 | 82 | ..... | 30.00 | −.05 | 68.5 | +5.7 | 87 | 21 | 76 | 38 | 28 | 61 | ..... | ... | ... | ... | 9.97 | +7.0 | 14 | 5.9 | e. | 27 | nw. | 9 | 3 | 8 | 23 | ..... | .0 | .0 |
| Little Rock [3] | 357 | 94 | 102 | 29.67 | 30.05 | −.01 | 68.7 | +5.1 | 87 | 3 | 77 | 40 | 29 | 60 | 27 | 63 | 61 | 87 | 6.10 | +3.4 | 13 | 7.1 | s. | 24 | n. | 9 | 5 | 11 | 15 | 6.8 | .0 | .0 |
| Austin [3] | 605 | 68 | 90 | ..... | 29.99 | ..... | 74.3 | +6.0 | 90 | 8 | 82 | 44 | 31 | 66 | ..... | ... | ... | ... | 7.12 | +3.9 | 13 | 6.4 | s. | 24 | nw. | 31 | 2 | 14 | 15 | ..... | .0 | .0 |
| Brownsville [3] | 57 | 88 | 96 | 29.88 | 29.94 | ..... | 79.6 | +4.7 | 92 | 10 | 86 | 58 | 31 | 73 | 22 | 74 | 73 | 88 | 5.27 | +2.0 | 16 | 8.9 | se. | 30 | nw. | 31 | 10 | 12 | 9 | 5.4 | .0 | .0 |
| Corpus Christi [3] | 20 | 11 | 78 | 29.94 | 29.96 | −.04 | 79.6 | +6.4 | 90 | 10 | 85 | 56 | 31 | 74 | 21 | 73 | 72 | 90 | 4.56 | +2.1 | 18 | 10.4 | se. | 27 | s. | 30 | 4 | 12 | 15 | 6.6 | .0 | .0 |
| Dallas [1] | 512 | 6 | 46 | 29.46 | 30.00 | ..... | 71.3 | ..... | 92 | 9 | 79 | 38 | 28 | 63 | 26 | 65 | 63 | 81 | 4.57 | +1.9 | 12 | 10.7 | se. | 30 | s. | 6 | 1 | 12 | 18 | 7.5 | .0 | .0 |
| Fort Worth [1] | 679 | 35 | 56 | 29.30 | 30.01 | −.02 | 71.2 | ..... | 92 | 8 | 80 | 40 | 31 | 63 | 31 | 65 | 63 | 82 | 3.68 | +.9 | 12 | 11.2 | s. | 34 | sw. | 26 | 1 | 13 | 17 | 7.6 | .0 | .0 |
| Galveston [3] | 54 | 106 | 114 | 29.94 | 29.99 | −.04 | 77.6 | +4.9 | 88 | 10 | 82 | 52 | 31 | 73 | 27 | 73 | 71 | 84 | 11.47 | +7.1 | 15 | 11.3 | s. | 33 | se. | 15 | 5 | 16 | 10 | 5.8 | .0 | .0 |
| Houston [3] | 138 | 157 | 190 | 29.86 | 30.00 | ..... | 75.7 | +5.4 | 90 | 9 | 83 | 49 | 31 | 68 | 21 | 70 | 69 | 90 | 10.23 | +6.5 | 13 | 10.0 | se. | 25 | e. | 15 | 4 | 15 | 12 | 6.6 | .0 | .0 |
| Palestine | 510 | 64 | 72 | 29.50 | 30.03 | .00 | 72.4 | +5.2 | 90 | 5 | 81 | 41 | 28 | 64 | 25 | 66 | 64 | 82 | 6.29 | +3.0 | 11 | 6.8 | s. | 20 | nw. | 31 | 4 | 13 | 14 | 6.7 | .0 | .0 |
| Port Arthur | 34 | 59 | 134 | 29.98 | 30.01 | ..... | 77.0 | ..... | 89 | 6 | 84 | 50 | 31 | 71 | 27 | 71 | 70 | 83 | 9.44 | +6.1 | 9 | 12.9 | s. | 34 | se. | 15 | 5 | 16 | 10 | 6.1 | .0 | .0 |
| San Antonio [1] | 693 | 28 | 59 | 29.26 | 29.98 | −.05 | 75.8 | ..... | 90 | 7 | 84 | 46 | 31 | 68 | 25 | 70 | 68 | 85 | 3.13 | +.9 | 12 | 7.8 | se. | 28 | s. | 8 | 1 | 11 | 19 | 7.6 | .0 | .0 |

See footnotes at end of table.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

| District and station | Elevation of instruments: Barometer above sea level | Elevation of instruments: Thermometer above ground | Elevation of instruments: Anemometer above ground | Pressure: Station, reduced to mean of 24 hours | Pressure: Sea level, reduced to mean of 24 hours | Pressure: Departure from normal | Temperature of the air: Mean max.+ mean min.÷2 | Temperature of the air: Departure from normal | Temperature of the air: Maximum | Temperature of the air: Date | Temperature of the air: Mean maximum | Temperature of the air: Minimum | Temperature of the air: Date | Temperature of the air: Mean minimum | Temperature of the air: Greatest daily range | Mean wet thermometer | Mean temperature of the dewpoint | Mean relative humidity | Precipitation: Total | Precipitation: Departure from normal | Precipitation: Days with 0.01 inch, or more | Wind: Average hourly velocity | Wind: Prevailing direction | Wind: Maximum velocity: Miles per hour | Wind: Maximum velocity: Direction | Wind: Maximum velocity: Date | Clear days | Partly cloudy days | Cloudy days | Average cloudiness, tenths | Total snowfall | Snow, sleet, and ice on ground at end of month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ohio Valley and Tennessee* | *Ft.* | *Ft.* | *Ft.* | *In.* | *In.* | *In.* | *° F.* | *° F.* | *°F.* | | *°F.* | *°F.* | | *°F.* | *° F.* | *° F.* | *° F.* | *—* | *In.* | *In.* | | *Miles* | | | | | | | | *0–10* | *In.* | *In.* |
| | | | | | | | 62.3 | + 5.3 | | | | | | | | | | 79 | 4.89 | +2.3 | | | | | | | | | | | 6.2 | |
| Chattanooga [1] | 762 | 21 | 54 | 29.31 | 30.12 | +.03 | 67.5 | ..... | 93 | 6 | 80 | 35 | 26 | 55 | 42 | 59 | 55 | 78 | 2.72 | ..... | 6 | 5.5 | s. | 33 | sw. | 27 | 8 | 12 | 11 | 5.8 | 0.0 | 0.0 |
| Knoxville [2] | 995 | 66 | 84 | 29.04 | 30.13 | +.04 | 67.1 | +7.2 | 92 | 6 | 78 | 40 | 5 | 56 | 36 | 58 | 54 | 73 | 2.54 | −.1 | 10 | 4.6 | ne. | 22 | nw. | 9 | 9 | 12 | 10 | 5.3 | .0 | .0 |
| Memphis [2] | 399 | 78 | 86 | 29.64 | 30.06 | −.01 | 69.0 | +5.7 | 92 | 1 | 80 | 39 | 29 | 58 | 37 | 62 | 60 | 81 | 5.62 | +2.9 | 13 | 7.4 | e. | 27 | w. | 31 | 9 | 13 | 9 | 5.6 | .0 | .0 |
| Nashville [1] | 546 | 5 | 72 | 29.51 | 30.10 | +.02 | 67.8 | ..... | 93 | 6 | 79 | 36 | 29 | 56 | 38 | 59 | 54 | 70 | 2.12 | −.4 | 9 | 8.2 | s. | 30 | nw. | 9 | 11 | 8 | 12 | 5.6 | .0 | .0 |
| Lexington | 989 | 6 | ... | 29.07 | 30.14 | +.06 | 63.0 | +5.6 | 93 | 6 | 75 | 30 | 29 | 51 | 36 | ... | ... | ... | 4.22 | ..... | 14 | ..... | s. | ... | ... | ... | 13 | 6 | 12 | 4.8 | .0 | .0 |
| Louisville [2] | 525 | 106 | 120 | 29.53 | 30.09 | +.01 | 63.8 | +4.5 | 90 | 6 | 72 | 36 | 29 | 55 | 30 | 56 | 53 | 78 | 5.80 | +3.2 | 16 | 8.3 | sw. | 31 | sw. | 31 | 9 | 7 | 15 | 6.0 | .0 | .0 |
| Evansville [1] | 431 | 5 | 38 | 29.62 | 30.08 | .00 | 62.6 | ..... | 90 | 6 | 73 | 34 | 29 | 52 | 36 | 56 | 54 | 80 | 8.33 | +5.5 | 16 | 7.6 | sw. | 26 | s. | 31 | 8 | 7 | 16 | 6.5 | .0 | .0 |
| Indianapolis [2] | 823 | 98 | 129 | 29.20 | 30.08 | +.01 | 60.4 | +4.7 | 82 | 6 | 68 | 32 | 29 | 52 | 25 | 54 | 51 | 84 | 7.19 | +4.4 | 16 | 7.5 | s. | 25 | sw. | 5 | 6 | 9 | 16 | 6.8 | .0 | .0 |
| Terre Haute [2] | 575 | 68 | 149 | 29.47 | 30.08 | ..... | 61.0 | ..... | 88 | 6 | 70 | 31 | 28 | 52 | 29 | 55 | 52 | 83 | 7.12 | +4.4 | 18 | 8.9 | sw. | 30 | s. | 26 | 7 | 9 | 15 | 6.5 | .0 | .0 |
| Cincinnati [2] | 627 | 11 | 51 | 29.43 | 30.11 | +.03 | 61.6 | +5.9 | 91 | 6 | 71 | 30 | 29 | 52 | 30 | 55 | 52 | 80 | 4.38 | +1.9 | 14 | 7.0 | sw. | 24 | sw. | 7 | 6 | 9 | 18 | 6.4 | .0 | .0 |
| Columbus [2] | 822 | 90 | 110 | 29.23 | 30.11 | +.03 | 59.7 | +4.5 | 87 | 7 | 68 | 34 | 28 | 51 | 28 | 52 | 49 | 81 | 4.66 | +2.2 | 14 | 9.0 | s. | 33 | sw. | 7 | 6 | 9 | 16 | 6.7 | .0 | .0 |
| Dayton [2] | 900 | 186 | 213 | 29.14 | 30.11 | ..... | 59.4 | +4.4 | 84 | 5 | 67 | 30 | 29 | 51 | 27 | 53 | 50 | 80 | 6.35 | +3.8 | 15 | 9.5 | sw. | 33 | sw. | 7 | 6 | 10 | 15 | 6.6 | .0 | .0 |
| Elkins [2] | 1,947 | 61 | 78 | 28.11 | 30.16 | +.06 | 57.9 | +5.6 | 86 | 5 | 70 | 26 | 29 | 46 | 39 | 50 | 48 | 85 | 2.83 | −.1 | 14 | 5.3 | w. | 22 | nw. | 23 | 5 | 8 | 18 | 7.0 | .0 | .0 |
| Parkersburg | 637 | 77 | 84 | 29.44 | 30.12 | +.04 | 61.4 | +5.3 | 90 | 7 | 71 | 31 | 29 | 51 | 35 | 55 | 51 | 78 | 3.06 | +.6 | 13 | 5.3 | se. | 22 | nw. | 23 | 8 | 11 | 12 | 6.0 | .0 | .0 |
| Pittsburgh [1] | 842 | 39 | 54 | 29.21 | 30.12 | +.04 | 58.4 | ..... | 87 | 7 | 67 | 32 | 26 | 50 | 30 | 52 | 48 | 77 | 3.55 | +1.0 | 15 | 10.2 | s. | 37 | nw. | 10 | 4 | 11 | 16 | 6.7 | .0 | .0 |
| *Lower Lake Region* | | | | | | | 53.8 | +2.1 | | | | | | | | | | 79 | 3.45 | +0.6 | | | | | | | | | | 7.4 | | |
| Buffalo [2] | 768 | 243 | 280 | 29.24 | 30.07 | +.02 | 52.8 | +.9 | 77 | 7 | 59 | 32 | 28 | 46 | 27 | 48 | 44 | 78 | 2.40 | −.9 | 15 | 15.9 | w. | 47 | sw. | 7 | 3 | 8 | 20 | 7.5 | T | .0 |
| Canton | 448 | 10 | 61 | 29.55 | 30.03 | ..... | 47.4 | +.2 | 81 | 7 | 57 | 19 | 26 | 38 | 34 | 43 | 40 | 80 | 3.59 | +.6 | 15 | 8.8 | w. | 30 | w. | 5 | 5 | 5 | 21 | 7.8 | T | .0 |
| Ithaca | 836 | 77 | 100 | ..... | ..... | ..... | 53.2 | +2.1 | 87 | 7 | 63 | 28 | 29 | 44 | 35 | ... | ... | ... | 1.73 | −1.3 | 16 | 9.5 | nw. | 36 | nw. | 23 | 3 | 8 | 20 | 7.5 | T | .0 |
| Oswego | 335 | 71 | 85 | 29.68 | 30.05 | .00 | 52.4 | +1.2 | 85 | 7 | 59 | 28 | 29 | 46 | 27 | 48 | 44 | 74 | 3.70 | +.4 | 15 | 10.4 | s. | 29 | nw. | 23 | 4 | 9 | 18 | 7.4 | T | .0 |
| Rochester [1] | 523 | 5 | 69 | 29.50 | 30.07 | +.02 | 52.2 | ..... | 88 | 7 | 61 | 30 | 26 | 43 | 35 | 47 | 44 | 80 | 3.32 | +.7 | 14 | 10.7 | sw. | 39 | nw. | 23 | 3 | 7 | 21 | 7.5 | T | .0 |
| Syracuse [1] | 596 | 5 | 51 | 29.41 | 30.06 | .00 | 52.7 | ..... | 85 | 7 | 62 | 27 | 26 | 44 | 32 | 48 | 44 | 78 | 3.63 | +.8 | 17 | 10.5 | sw. | 34 | w. | 23 | 3 | 5 | 23 | 7.9 | T | .0 |
| Erie [2] | 714 | 57 | 81 | 29.31 | 30.08 | +.03 | 56.6 | +3.2 | 88 | 7 | 63 | 39 | 28 | 50 | 27 | 51 | 48 | 82 | 3.20 | −.5 | 14 | 8.5 | s. | 26 | nw. | 10 | 0 | 10 | 21 | 8.1 | .0 | .0 |
| Cleveland [1] | 762 | 27 | 54 | 29.26 | 30.09 | +.03 | 56.4 | ..... | 88 | 6 | 65 | 34 | 26 | 48 | 28 | 51 | 48 | 78 | 3.22 | +.4 | 14 | 11.0 | s. | 37 | w. | 10 | 3 | 8 | 20 | 7.7 | .0 | .0 |
| Sandusky | 629 | 5 | 67 | ..... | ..... | ..... | 57.7 | +3.4 | 88 | 6 | 66 | 34 | 28 | 49 | 29 | ... | ... | ... | 3.04 | +.6 | 14 | 9.0 | sw. | 27 | sw. | 5 | 5 | 7 | 19 | 7.1 | .0 | .0 |
| Toledo [2] | 628 | 79 | 87 | 29.40 | 30.09 | +.04 | 56.8 | +3.4 | 85 | 6 | 65 | 31 | 28 | 49 | 29 | 50 | 47 | 80 | 4.32 | +2.0 | 13 | 9.1 | w. | 31 | w. | 7 | 7 | 10 | 14 | 6.4 | .0 | .0 |
| Fort Wayne [1] | 857 | 69 | 84 | 29.16 | 30.09 | ..... | 55.5 | ..... | 82 | 5 | 65 | 28 | 29 | 46 | 32 | 51 | 49 | 84 | 6.15 | +3.6 | 14 | 8.4 | sw. | 30 | w. | 7 | 6 | 9 | 16 | 6.9 | .0 | .0 |
| Detroit [1] | 730 | 5 | 78 | 29.41 | 30.09 | +.04 | 55.3 | ..... | 84 | 5 | 64 | 32 | 29 | 47 | 30 | ... | ... | 78 | 3.08 | +.7 | 15 | 9.2 | nw. | 35 | sw. | 7 | 2 | 12 | 17 | ..... | .0 | .0 |
| *Upper Lake Region* | | | | | | | 50.2 | +2.1 | | | | | | | | | | 82 | 4.78 | +2.2 | | | | | | | | | | 7.0 | | |
| Alpena | 609 | 5 | 89 | 29.37 | 30.04 | +.01 | 49.4 | +2.3 | 77 | 5 | 57 | 30 | 27 | 42 | 28 | 46 | 43 | 83 | 3.87 | +1.2 | 18 | 11.5 | nw. | 36 | w. | 7 | 2 | 9 | 20 | 7.7 | T | .0 |
| Escanaba | 612 | 51 | 72 | ..... | 30.04 | +.03 | 48.2 | +2.2 | 66 | 14 | 55 | 26 | 27 | 42 | ... | ... | ... | 82 | 4.05 | +1.4 | 15 | 11.0 | s. | 36 | n. | 27 | 4 | 11 | 16 | --- | T | .0 |
| Grand Rapids [2] | 707 | 70 | 244 | 29.27 | 30.04 | .00 | 54.4 | +3.2 | 78 | 5 | 62 | 32 | 29 | 46 | 31 | 48 | 46 | 85 | 6.47 | +3.7 | 17 | 10.8 | s. | 44 | sw. | 7 | 5 | 9 | 17 | 6.7 | .0 | .0 |
| Lansing [2] | 878 | 5 | 90 | 29.12 | 30.07 | ..... | 52.9 | +2.6 | 79 | 5 | 61 | 32 | 29 | 45 | 28 | 49 | 46 | 84 | 7.33 | +4.9 | 17 | 8.3 | nw. | 27 | sw. | 7 | 4 | 10 | 17 | 7.0 | .0 | .0 |
| Marquette | 734 | 44 | 73 | 29.20 | 30.02 | +.01 | 47.4 | +.7 | 72 | 13 | 54 | 27 | 27 | 41 | 23 | 44 | 40 | 79 | 4.15 | +1.4 | 12 | 9.1 | w. | 39 | sw. | 7 | 5 | 8 | 18 | 7.1 | .1 | .0 |
| Sault Sainte Marie [2] | 614 | 11 | 52 | 29.34 | 30.02 | +.01 | 44.8 | +.2 | 69 | 7 | 52 | 24 | 28 | 38 | 27 | 42 | 40 | 86 | 5.63 | +2.5 | 14 | 11.6 | e. | 46 | sw. | 7 | 2 | 4 | 25 | 8.3 | 2.7 | .0 |
| Chicago | 673 | 7 | 131 | 29.34 | 30.06 | +.02 | 56.9 | +2.9 | 81 | 5 | 64 | 30 | 28 | 50 | 25 | 52 | 49 | 79 | 8.44 | +5.9 | 16 | 9.7 | s. | 34 | n. | 27 | 10 | 5 | 16 | 6.4 | .0 | .0 |
| Green Bay | 617 | 109 | 141 | 29.36 | 30.03 | +.01 | 51.7 | +3.2 | 69 | 5 | 59 | 25 | 28 | 44 | 29 | 47 | 43 | 78 | 3.39 | +.8 | 18 | 10.2 | s. | 38 | nw. | 23 | 8 | 6 | 17 | 6.8 | T | .0 |
| Milwaukee [1] | 681 | 33 | 66 | 29.31 | 30.05 | +.02 | 52.5 | ..... | 77 | 5 | 61 | 25 | 28 | 44 | 31 | 48 | 46 | 84 | 2.86 | +.5 | 17 | 10.5 | s. | 42 | sw. | 7 | 9 | 6 | 16 | 6.4 | .0 | .0 |
| Duluth | 1,133 | 5 | 47 | 28.79 | 30.03 | +.03 | 46.0 | +1.9 | 66 | 14 | 55 | 18 | 28 | 38 | 28 | 40 | 37 | 81 | 1.62 | −.7 | 13 | 11.9 | w. | 36 | w. | 7 | 8 | 7 | 16 | 6.5 | T | .0 |
| *North Dakota* | | | | | | | 45.2 | +1.8 | | | | | | | | | | 75 | 1.20 | 0.0 | | | | | | | | | | 6.5 | | |
| Moorhead, Minn. [2] | 940 | 50 | 58 | 28.98 | 30.01 | +.01 | 46.4 | +1.9 | 74 | 16 | 56 | 15 | 28 | 37 | 33 | 41 | 37 | 78 | 1.93 | +.2 | 7 | 8.2 | s. | 29 | s. | 16 | 9 | 10 | 12 | 5.7 | 1.1 | T |
| Bismarck [1] | 1,677 | 4 | 41 | 28.22 | 30.03 | +.04 | 45.8 | ..... | 70 | 16 | 58 | 15 | 28 | 34 | 39 | 40 | 36 | 74 | 1.01 | +.1 | 6 | 9.4 | nw. | 34 | n. | 26 | 10 | 7 | 14 | 6.1 | T | .0 |
| Devils Lake | 1,478 | 11 | 44 | 28.42 | 30.01 | +.02 | 44.0 | +1.6 | 69 | 12 | 54 | 11 | 30 | 34 | 32 | 39 | 35 | 80 | 1.50 | +.2 | 6 | 8.4 | sw. | 25 | n | 26 | 10 | 8 | 13 | 6.0 | 2.0 | .6 |
| Lemmon, S. Dak | 2,602 | 4 | 38 | 29.28 | 30.03 | ..... | 45.2 | ..... | 72 | 12 | 57 | 17 | 31 | 34 | 40 | 39 | 35 | ... | .62 | ..... | 5 | ..... | w. | ... | ... | ... | 12 | 1 | 18 | ..... | T | .0 |
| Grand Forks | 832 | 11 | 71 | 29.10 | 30.02 | ..... | 43.8 | ..... | 72 | 16 | 55 | 11 | 28 | 32 | 35 | 39 | 36 | ... | 1.06 | ..... | 4 | ..... | ..... | ... | ... | ... | ... | ... | ... | ..... | 1.3 | T |
| Williston | 1,878 | 42 | 50 | 28.02 | 30.02 | +.04 | 45.2 | +1.8 | 74 | 12 | 57 | 15 | 28 | 34 | 39 | 39 | 33 | 69 | .34 | −.5 | 5 | 6.3 | sw. | 21 | w. | 14 | 17 | 5 | 9 | 4.5 | .1 | .0 |
| *Upper Mississippi Valley* | | | | | | | 57.6 | +3.9 | | | | | | | | | | 81 | 7.55 | +5.1 | | | | | | | | | | 6.4 | | |
| Minneapolis-St. Paul, Minn. [1] | 919 | 32 | 61 | 29.02 | 30.02 | +.01 | 50.8 | ..... | 73 | 12 | 60 | 22 | 28 | 42 | 34 | 46 | 42 | 77 | 5.52 | +3.4 | 16 | 9.7 | se. | 33 | w. | 7 | 10 | 5 | 16 | 6.1 | T | .0 |
| Springfield, Minn. | 1,025 | 4 | 42 | 28.91 | 30.02 | ..... | 51.4 | ..... | 77 | 12 | 61 | 21 | 28 | 41 | 40 | 46 | 43 | ... | 3.73 | ..... | 12 | ..... | nw. | ... | ... | ... | 9 | 7 | 15 | ..... | T | .0 |
| La Crosse [2] | 714 | 11 | 48 | 29.25 | 30.03 | +.01 | 52.4 | +2.1 | 72 | 11 | 61 | 24 | 28 | 44 | 30 | 47 | 44 | 83 | 5.50 | +3.2 | 17 | 5.0 | s. | 22 | n. | 27 | 9 | 8 | 14 | 6.2 | T | .0 |
| Madison [2] | 974 | 70 | 78 | 29.00 | 30.06 | +.03 | 53.7 | +3.4 | 72 | 5 | 61 | 28 | 28 | 46 | 27 | 48 | 45 | 84 | 3.93 | +1.5 | 14 | 7.7 | s. | 22 | sw. | 11 | 10 | 8 | 13 | 6.2 | .0 | .0 |
| Charles City | 1,015 | 10 | 51 | 28.95 | 30.05 | +.03 | 52.2 | +3.6 | 72 | 12 | 62 | 21 | 28 | 43 | 34 | 48 | 45 | 82 | 5.96 | +3.6 | 14 | 5.9 | se. | 24 | sw. | 5 | 11 | 7 | 13 | 5.9 | .0 | .0 |
| Davenport [2] | 606 | 66 | 161 | 29.39 | 30.06 | +.02 | 57.0 | +3.3 | 78 | 5 | 65 | 27 | 28 | 49 | 28 | 51 | 49 | 86 | 8.10 | +5.7 | 16 | 8.3 | se. | 30 | sw. | 22 | 6 | 7 | 18 | 7.0 | .0 | .0 |
| Des Moines [2] | 860 | 5 | 99 | 29.09 | 30.02 | −.01 | 55.8 | +2.4 | 80 | 6 | 65 | 26 | 28 | 47 | 33 | 50 | 46 | 78 | 7.27 | +4.8 | 16 | 8.4 | se. | 40 | w. | 6 | 9 | 6 | 16 | 6.1 | .0 | .0 |
| Dubuque | 699 | 60 | 79 | 29.29 | 30.04 | .00 | 55.0 | +3.1 | 74 | 12 | 64 | 26 | 28 | 46 | 29 | 50 | 46 | 78 | 3.99 | +1.5 | 15 | 5.0 | s. | 23 | nw. | 27 | 7 | 6 | 18 | 6.7 | .0 | .0 |
| Keokuk | 614 | 64 | 78 | 29.40 | 30.05 | .00 | 59.2 | +3.8 | 80 | 5 | 68 | 27 | 28 | 51 | 30 | ... | ... | ... | 11.29 | +9.0 | 17 | 6.6 | sw. | 34 | sw. | 7 | 8 | 3 | 20 | 6.8 | .0 | .0 |
| Cairo | 358 | 87 | 93 | 29.69 | 30.07 | .00 | 66.0 | +5.6 | 88 | 6 | 75 | 37 | 29 | 57 | 25 | ... | ... | ... | 7.66 | +4.9 | 13 | 7.6 | s. | 32 | sw. | 31 | 7 | 9 | 15 | 6.2 | .0 | .0 |
| Peoria [2] | 609 | 11 | 45 | 29.40 | 30.05 | .00 | 58.0 | +6.0 | 83 | 5 | 67 | 27 | 28 | 49 | 32 | 53 | 50 | 85 | 10.53 | +8.2 | 18 | 4.7 | s. | 19 | sw. | 31 | 9 | 8 | 14 | 5.6 | .0 | .0 |
| Springfield, Ill. [2] | 636 | 5 | 191 | 29.38 | 30.06 | +.01 | 60.9 | +5.1 | 85 | 5 | 69 | 30 | 28 | 53 | 25 | 54 | 52 | 86 | 13.39 | +10.9 | 18 | 10.2 | s. | 31 | sw. | 4 | 6 | 6 | 19 | 7.3 | .0 | .0 |
| St. Louis [4] | 568 | 179 | 303 | 29.45 | 30.05 | −.01 | 63.3 | +4.5 | 88 | 5 | 71 | 32 | 28 | 56 | 23 | 57 | 53 | 74 | 7.46 | +4.7 | 16 | 11.5 | sw. | 35 | sw. | 31 | 6 | 10 | 15 | 6.5 | .0 | .0 |
| *Missouri Valley* | | | | | | | 55.8 | +2.3 | | | | | | | | | | 81 | 7.16 | +4.9 | | | | | | | | | | 6.9 | | |
| Columbia, Mo [2] | 784 | 6 | 66 | 29.20 | 30.04 | −.01 | 61.4 | +4.8 | 85 | 6 | 69 | 28 | 28 | 54 | 27 | 56 | 54 | 83 | 13.44 | +10.8 | 17 | 6.7 | s. | 21 | w. | 7 | 5 | 12 | 14 | 6.8 | .0 | .0 |
| Kansas City [1] | 963 | 38 | 76 | 29.00 | 30.03 | −.01 | 60.4 | ..... | 85 | 13 | 68 | 29 | 28 | 53 | 27 | 55 | 52 | 78 | 11.94 | +9.0 | 12 | 9.5 | sw. | 37 | nw. | 6 | 6 | 6 | 19 | 7.2 | .0 | .0 |
| St. Joseph [2] | 967 | 11 | 49 | 28.99 | 30.02 | ..... | 58.4 | +2.4 | 83 | 13 | 67 | 26 | 28 | 50 | 29 | 54 | 52 | 89 | 6.59 | +3.7 | 16 | 7.7 | s. | 35 | w. | 6 | 3 | 8 | 20 | 7.4 | T | .0 |
| Springfield, Mo [1] | 1,324 | 5 | 60 | 28.65 | 30.05 | .00 | 62.0 | ..... | 83 | 6 | 70 | 27 | 28 | 54 | 27 | 57 | 56 | 89 | 8.86 | +5.8 | 17 | 10.6 | se. | 32 | sw. | 31 | 3 | 7 | 21 | 7.7 | .0 | .0 |
| Topeka | 987 | 65 | 87 | 28.97 | 30.02 | ..... | 59.5 | +2.5 | 86 | 13 | 68 | 29 | 28 | 51 | 31 | 55 | 52 | 80 | 10.65 | +8.2 | 13 | 8.0 | s. | 29 | nw. | 26 | 4 | 9 | 18 | 7.4 | 1.0 | 1.0 |
| Lincoln [2] | 1,189 | 11 | 81 | 28.74 | 30.01 | −.02 | 55.8 | +1.6 | 84 | 13 | 65 | 25 | 28 | 46 | 37 | 50 | 47 | 82 | 3.93 | +1.2 | 12 | 8.5 | s. | 34 | nw. | 26 | 8 | 5 | 18 | 6.7 | 3.0 | 3.0 |
| Omaha [1] | 1,105 | 31 | 44 | 28.84 | 30.02 | −.01 | 55.2 | ..... | 82 | 6 | 65 | 25 | 28 | 45 | 36 | 50 | 47 | 81 | 3.57 | +1.4 | 11 | 10.3 | se. | 44 | nw. | 27 | 9 | 4 | 18 | 6.4 | 5.2 | 5.2 |
| Valentine | 2,598 | 46 | 54 | 27.31 | 30.03 | +.02 | 49.6 | +.3 | 80 | 12 | 60 | 22 | 31 | 39 | 46 | 44 | 39 | 73 | 2.79 | +1.7 | 11 | 8.4 | n. | 35 | n. | 26 | 9 | 5 | 17 | 6.4 | T | .0 |
| Sioux City [1] | 1,138 | 5 | 27 | 28.80 | 30.03 | +.01 | 53.0 | ..... | 82 | 6 | 64 | 20 | 28 | 42 | 42 | 48 | 44 | 79 | 2.99 | ..... | 12 | 8.6 | se. | 35 | nw. | 26 | 6 | 11 | 14 | 6.4 | .2 | .2 |
| Huron | 1,301 | 26 | 41 | 28.62 | 30.02 | +.01 | 50.0 | +2.3 | 79 | 12 | 61 | 21 | 28 | 39 | 43 | 45 | 41 | 77 | 3.54 | +2.3 | 10 | 11.5 | n. | 44 | n. | 26 | 7 | 6 | 18 | 6.6 | T | .0 |
| *Northern Slope* | | | | | | | 46.0 | +0.2 | | | | | | | | | | 71 | 1.28 | +0.3 | | | | | | | | | | 5.7 | | |
| Billings [1] | 3,570 | 18 | 39 | 26.35 | 30.04 | ..... | 46.0 | ..... | 73 | 12 | 58 | 17 | 30 | 34 | 34 | 39 | 33 | 66 | 1.24 | ..... | 5 | 10.8 | sw. | 45 | nw. | 17 | 10 | 15 | 6 | 4.7 | 1.0 | .0 |
| Havre | 2,507 | 11 | 67 | 27.36 | 30.02 | +.04 | 46.2 | +1.7 | 75 | 16 | 60 | 9 | 30 | 32 | 41 | 38 | 31 | 62 | .19 | −.5 | 3 | 8.8 | sw. | 35 | sw. | 10 | 12 | 11 | 8 | 4.7 | .6 | .0 |
| Helena [1] | 4,124 | 5 | 35 | 25.84 | 30.09 | +.06 | 42.4 | ..... | 68 | 15 | 55 | 13 | 30 | 30 | 40 | 37 | 31 | 67 | .88 | .0 | 5 | 7.7 | w. | 31 | s. | 10 | 12 | 9 | 10 | 5.2 | .5 | .0 |
| Missoula [2] | 3,263 | 80 | 91 | 26.69 | 30.10 | ..... | 45.0 | +.2 | 70 | 11 | 56 | 21 | 30 | 34 | 36 | 39 | 35 | 77 | 1.07 | −.1 | 8 | 5.7 | se. | 32 | no. | 28 | 11 | 6 | 14 | 5.6 | T | T |
| Kalispell | 2,973 | 48 | 56 | 26.98 | 30.06 | +.05 | 43.2 | −.3 | 62 | 22 | 52 | 19 | 30 | 34 | 28 | 39 | 36 | 78 | .82 | −.2 | 8 | 5.1 | w. | 21 | n. | 28 | 7 | 8 | 16 | 6.8 | T | .0 |
| Miles City [2] | 2,371 | 48 | 55 | 27.53 | 30.05 | +.05 | 46.8 | +.3 | 74 | 12 | 58 | 19 | 30 | 35 | 37 | 40 | 36 | 74 | 1.46 | +.6 | 3 | 5.7 | s. | 25 | nw. | 28 | 12 | 8 | 11 | 5.5 | 4.3 | .0 |
| Rapid City [2] | 3,259 | 50 | 58 | 26.65 | 30.04 | +.03 | 48.0 | −.5 | 82 | 12 | 59 | 22 | 30 | 37 | 42 | 40 | 34 | 70 | 2.06 | +1.1 | 10 | 7.2 | w. | 29 | nw. | 26 | 12 | 4 | 15 | 5.7 | 1.0 | .0 |
| Cheyenne [1] | 6,094 | 5 | 39 | 24.03 | 30.02 | +.01 | 44.8 | ..... | 73 | 12 | 56 | 18 | 30 | 33 | 40 | 38 | 33 | 71 | 1.43 | +.5 | 11 | 10.0 | nw. | 34 | nw. | 26 | 7 | 10 | 14 | 6.3 | 1.0 | .0 |
| Lander | 5,352 | 60 | 68 | 24.70 | 30.06 | +.02 | 42.2 | −1.3 | 71 | 12 | 54 | 16 | 30 | 30 | 40 | 37 | 32 | 70 | 2.55 | +1.2 | 10 | 3.9 | sw. | 21 | sw. | 12 | 10 | 8 | 13 | 6.1 | 12.4 | .9 |
| Sheridan [2] | 3,790 | 6 | 42 | 26.14 | 30.06 | ..... | 44.4 | −.2 | 73 | 10 | 57 | 8 | 30 | 31 | 45 | 38 | 32 | 70 | 1.30 | +.2 | 8 | 7.7 | nw. | 38 | nw. | 28 | 10 | 7 | 14 | 6.0 | 4.4 | .0 |
| North Platte [2] | 2,821 | 11 | 51 | 27.09 | 30.02 | .00 | 52.0 | +2.3 | 80 | 12 | 62 | 25 | 31 | 42 | 41 | 45 | 41 | 76 | 1.07 | .0 | 8 | 7.6 | se. | 38 | nw. | 26 | 10 | 10 | 11 | 5.6 | .0 | .0 |

See footnotes at end of table.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

| District and station | Elevation of instruments: Barometer above sea level | Elevation of instruments: Thermometer above ground | Elevation of instruments: Anemometer above ground | Pressure: Station, reduced to mean of 24 hours | Pressure: Sea level, reduced to mean of 24 hours | Pressure: Departure from normal | Temperature of the air: Mean max.+ mean min.÷2 | Temperature of the air: Departure from normal | Temperature of the air: Maximum | Temperature of the air: Date | Temperature of the air: Mean maximum | Temperature of the air: Minimum | Temperature of the air: Date | Temperature of the air: Mean minimum | Temperature of the air: Greatest daily range | Mean wet thermometer | Mean temperature of the dewpoint | Mean relative humidity | Precipitation: Total | Precipitation: Departure from normal | Precipitation: Days with 0.01 inch, or more | Wind: Average hourly velocity | Wind: Prevailing direction | Wind: Maximum velocity: Miles per hour | Wind: Maximum velocity: Direction | Wind: Maximum velocity: Date | Clear days | Partly cloudy days | Cloudy days | Average cloudiness, tenths | Total snowfall | Snow, sleet, and ice on ground at end of month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Ft.* | *Ft.* | *Ft.* | *In.* | *In.* | *In.* | *° F.* | *° F.* | *°F.* | | *°F.* | *°F.* | | *°F.* | *° F.* | *° F.* | *° F.* | *—* | *In.* | *In.* | | *Miles* | | | | | | | | *0–10* | *In.* | *In.* |
| ***Middle Slope*** | | | | | | | **59.** | **2+1.3** | | | | | | | | | | **77** | **4.90** | **+3.2** | | | | | | | | | | **6.3** | | |
| Denver [1] | 5,292 | 106 | 113 | 24.76 | 30.00 | −.01 | 50.1 | ..... | 77 | 12 | 60 | 25 | 31 | 41 | 33 | 42 | 36 | 69 | 1.95 | +.9 | 13 | 6.4 | s. | 30 | nw. | 26 | 11 | 10 | 10 | 5.1 | 0.4 | 0.0 |
| Pueblo [1] | 4,690 | 5 | 36 | 25.30 | 29.98 | −.01 | 51.8 | ..... | 84 | 12 | 65 | 24 | 31 | 39 | 46 | 44 | 38 | 68 | 2.56 | +1.9 | 7 | 7.3 | w. | 43 | w. | 13 | 10 | 13 | 8 | 4.9 | T | .0 |
| Concordia | 1,392 | 50 | 58 | 28.55 | 30.03 | .00 | 56.5 | +.6 | 86 | 13 | 65 | 28 | 28 | 48 | 32 | 52 | 49 | 81 | 5.87 | +3.9 | 15 | 7.4 | s. | 32 | nw. | 26 | 6 | 6 | 19 | 7.1 | 3.8 | 3.4 |
| Dodge City | 2,509 | 10 | 36 | 27.41 | 30.00 | −.02 | 57.1 | +1.0 | 92 | 13 | 67 | 30 | 31 | 47 | 39 | 51 | 47 | 76 | 3.89 | +2.6 | 13 | 11.3 | s. | 37 | nw. | 26 | 4 | 12 | 15 | 6.6 | 4.0 | T |
| Wichita [1] | 1,358 | 6 | 64 | 28.58 | 30.01 | −.02 | 59.4 | ..... | 86 | 13 | 68 | 30 | 28 | 51 | 30 | 55 | 53 | 86 | 4.81 | +2.2 | 16 | 14.1 | s. | 40 | nw. | 26 | 5 | 8 | 18 | 7.3 | .2 | .0 |
| Oklahoma City [2] | 1,214 | 10 | 47 | 28.74 | 30.01 | −.02 | 63.9 | +2.4 | 85 | 13 | 71 | 34 | 28 | 56 | 29 | 59 | 57 | 84 | 10.35 | +7.5 | 21 | 8.7 | s. | 23 | se. | 2 | 8 | 6 | 17 | 6.8 | T | .0 |
| ***Southern Slope*** | | | | | | | **65.4** | **+2.2** | | | | | | | | | | **79** | **7.31** | **+5.5** | | | | | | | | | | **6.4** | | |
| Abilene [2] | 1,738 | 10 | 56 | 28.19 | 29.97 | −.04 | 68.4 | +3.0 | 89 | 8 | 76 | 39 | 31 | 60 | 24 | 62 | 60 | 84 | 10.88 | +8.4 | 13 | 9.3 | s. | 26 | s. | 6 | 3 | 10 | 18 | 7.3 | .0 | .0 |
| Amarillo [2] | 3,676 | 10 | 49 | 26.30 | 29.99 | −.01 | 58.2 | +.5 | 86 | 13 | 68 | 31 | 30 | 49 | 33 | 53 | 51 | 84 | 7.64 | +6.0 | 12 | 14.3 | s. | 46 | sw. | 4 | 8 | 10 | 13 | 6.3 | .7 | .0 |
| Del Rio | 960 | 63 | 71 | 28.95 | 29.92 | −.06 | 74.2 | +4.2 | 91 | 4 | 82 | 47 | 31 | 67 | 26 | 68 | 65 | 75 | 7.21 | +5.4 | 8 | 9.7 | se. | 24 | e. | 24 | 1 | 14 | 16 | 7.4 | .0 | .0 |
| Roswell | 3,566 | 75 | 85 | 26.38 | 29.97 | +.01 | 60.8 | +1.3 | 87 | 13 | 72 | 34 | 31 | 50 | 38 | 54 | 49 | 72 | 3.51 | +2.1 | 11 | 7.7 | s. | 27 | nw. | 22 | 17 | 4 | 10 | 4.4 | .0 | .0 |
| ***Southern Plateau*** | | | | | | | **64.9** | **−1.3** | | | | | | | | | | **55** | **1.08** | **+0.5** | | | | | | | | | | **3.6** | | |
| El Paso [2] | 3,778 | 82 | 101 | 26.18 | 29.91 | −.01 | 55.2 | +1.7 | 89 | 13 | 76 | 41 | 31 | 54 | 32 | 54 | 47 | 60 | 1.65 | +.8 | 5 | 7.1 | e. | 27 | w. | 22 | 12 | 13 | 6 | 4.5 | .0 | .0 |
| Albuquerque [1] | 5,314 | 5 | 45 | 24.76 | 29.93 | ..... | 66.6 | ..... | 79 | 12 | 68 | 33 | 31 | 46 | 33 | 47 | 41 | 63 | 2.67 | +1.9 | 12 | 9.0 | se. | 42 | s. | 28 | 13 | 10 | 8 | 4.5 | .0 | .0 |
| Phoenix [2] | 1,107 | 39 | 87 | 28.74 | 29.88 | .00 | 98.2 | −2.4 | 96 | 10 | 82 | 44 | 30 | 55 | 39 | 55 | 47 | 55 | .50 | .0 | 4 | 5.1 | e. | 22 | w. | 2 | 15 | 10 | 6 | 4.0 | .0 | .0 |
| Tucson [1] | 2,555 | 5 | 23 | 27.29 | 29.87 | ..... | 67.2 | ..... | 93 | 10 | 81 | 37 | 30 | 53 | 38 | 53 | 43 | 48 | .53 | .0 | 2 | ..... | se. | ..... | ..... | ..... | 18 | 10 | 3 | 3.0 | .0 | .0 |
| Yuma | 142 | 9 | 54 | 29.74 | 29.89 | +.02 | 71.2 | −2.1 | 102 | 1 | 84 | 47 | 21 | 58 | 38 | 58 | 48 | 50 | .36 | +.1 | 3 | 5.5 | w. | 29 | nw. | 2 | 23 | 7 | 1 | 2.1 | .0 | .0 |
| Independence | 3,957 | 5 | 26 | 25.95 | 29.98 | +.03 | 55.0 | −2.5 | 86 | 1 | 69 | 34 | 22 | 41 | 39 | 42 | 28 | ... | .74 | +.4 | 4 | 4.8 | n. | ..... | ..... | ..... | ..... | 7 | 16 | 8 | 3.4 | .0 | .0 |
| ***Middle Plateau*** | | | | | | | **49.2** | **−1.2** | | | | | | | | | | **62** | **2.34** | **+1.5** | | | | | | | | | | **5.6** | | |
| Reno [2] | 4,527 | 61 | 76 | 25.48 | 30.02 | +.03 | 49.6 | −1.2 | 78 | 17 | 63 | 28 | 6 | 37 | 41 | 40 | 31 | 60 | 1.11 | +.8 | 9 | 4.9 | w. | 32 | w. | 12 | 11 | 12 | 8 | 4.8 | .0 | .0 |
| Tonopah | 6,090 | 12 | 20 | 24.04 | 29.98 | ..... | 47.2 | ..... | 76 | 1 | 57 | 30 | 21 | 38 | 27 | 38 | 28 | ... | 1.16 | ..... | 7 | ..... | se. | ..... | ..... | ..... | 9 | 14 | 8 | ..... | T | .0 |
| Winnemucca | 4,339 | 5 | 56 | 25.64 | 30.03 | −.02 | 47.8 | −.5 | 79 | 18 | 63 | 17 | 6 | 32 | 50 | 39 | 28 | 53 | 1.35 | +.7 | 7 | 7.2 | ne. | 25 | nw. | 12 | 13 | 4 | 14 | 5.4 | T | .0 |
| Modena | 5,473 | 10 | 46 | ..... | 25.0 | −3.0 | 77 | 1 | 58 | 21 | 7 | 32 | 42 | ..... | ..... | ..... | ..... | ..... | 3.67 | +2.9 | 11 | 8.6 | w. | 30 | ne. | 3 | 9 | 8 | 14 | 6.1 | .5 | .0 |
| Salt Lake City [2] | 4,357 | 86 | 210 | 25.62 | 30.00 | −.01 | 51.2 | −1.3 | 78 | 11 | 61 | 33 | 31 | 41 | 34 | 43 | 37 | 66 | 2.84 | +1.4 | 14 | 8.3 | se. | 34 | w. | 20 | 9 | 8 | 14 | 5.9 | .5 | .0 |
| Grand Junction | 4,602 | 60 | 68 | 25.30 | 29.97 | −.02 | 52.6 | −.2 | 75 | 11 | 63 | 29 | 31 | 42 | 30 | 46 | 40 | 68 | 2.73 | +1.8 | 15 | 5.8 | n. | 29 | s. | 5 | 8 | 10 | 13 | 5.6 | .0 | .0 |
| ***Northern Plateau*** | | | | | | | **49.9** | **−0.2** | | | | | | | | | | **68** | **0.91** | **−0.1** | | | | | | | | | | **6.5** | | |
| Baker [2] | 3,471 | 36 | 54 | 26.48 | 30.08 | .00 | 45.9 | −.7 | 71 | 18 | 58 | 23 | 30 | 34 | 38 | 40 | 35 | 75 | 1.01 | +.1 | 8 | 5.8 | s. | 19 | n. | 1 | 7 | 13 | 11 | 5.8 | .0 | .0 |
| Boise [1] | 2,739 | 5 | 49 | 27.19 | 30.03 | −.03 | 50.9 | ..... | 75 | 18 | 63 | 26 | 6 | 39 | 37 | 44 | 37 | 62 | 1.00 | ..... | 7 | 9.3 | se. | 26 | nw. | 13 | 11 | 11 | 9 | 5.5 | .0 | .0 |
| Pocatello [1] | 4,478 | 5 | 31 | 25.50 | 30.03 | −.01 | 46.6 | ..... | 73 | 11 | 60 | 19 | 30 | 33 | 44 | 39 | 32 | 63 | .47 | ..... | 7 | 8.4 | sw. | 34 | ne. | 2 | 8 | 9 | 14 | 6.0 | .2 | .0 |
| Spokane [1] | 1,929 | 27 | 42 | 28.01 | 30.06 | .00 | 47.5 | ..... | 70 | 15 | 57 | 28 | 30 | 38 | 31 | 44 | 39 | 75 | .85 | −.3 | 10 | 5.3 | ne. | 25 | sw. | 10 | 1 | 12 | 18 | 7.6 | .0 | .0 |
| Walla Walla | 991 | 57 | 65 | 28.99 | 30.07 | .00 | 52.6 | −.9 | 73 | 11 | 60 | 34 | 30 | 45 | 30 | ..... | ..... | ..... | 1.50 | .0 | 12 | 4.8 | s. | 24 | w. | 3 | 3 | 5 | 23 | 8.2 | .0 | .0 |
| Yakima | 1,076 | 58 | 67 | 28.91 | 30.07 | ..... | 51.2 | +1.0 | 72 | 15 | 62 | 31 | 30 | 40 | 33 | 45 | 39 | 67 | .28 | −.3 | 8 | 4.7 | nw. | 22 | sw. | 3 | 8 | 10 | 13 | 5.8 | .0 | .0 |
| ***North Pacific Coast Region*** | | | | | | | **54.4** | **+2.3** | | | | | | | | | | **81** | **3.17** | **−0.6** | | | | | | | | | | **7.1** | | |
| North Head | 211 | 5 | 56 | 29.83 | 30.06 | +.01 | 55.2 | +2.3 | 76 | 23 | 60 | 46 | 29 | 51 | 21 | 53 | 51 | 86 | 3.54 | −1.5 | 18 | 13.0 | s. | 49 | s. | 9 | 4 | 9 | 18 | 7.3 | .0 | .0 |
| Seattle [2] | 125 | 90 | 321 | 29.93 | 30.06 | +.01 | 54.6 | +3.2 | 70 | 14 | 60 | 40 | 29 | 49 | 18 | 51 | 48 | 82 | 2.39 | −.4 | 13 | 8.7 | s. | 27 | s. | 9 | 1 | 15 | 15 | 7.7 | .0 | .0 |
| Tacoma | 194 | 172 | 201 | 29.83 | 30.07 | +.03 | 53.2 | +2.7 | 70 | 14 | 59 | 39 | 29 | 48 | 21 | ..... | ..... | ..... | 2.36 | −1.0 | 16 | 7.4 | s. | 31 | sw. | 3 | 1 | 7 | 23 | 8.2 | .0 | .0 |
| Tatoosh Island | 86 | 9 | 61 | 29.94 | 30.03 | +.02 | 52.3 | +2.4 | 58 | 1 | 56 | 45 | 11 | 49 | 12 | 51 | 49 | 87 | 8.16 | .0 | 19 | 14.5 | s. | 50 | s. | 9 | 3 | 11 | 17 | 7.4 | .0 | .0 |
| Medford [1] | 1,329 | 29 | 58 | 28.67 | 30.08 | ..... | 52.6 | ..... | 76 | 24 | 65 | 33 | 6 | 40 | 38 | 47 | 42 | 70 | 1.35 | .0 | 7 | ..... | nw. | ..... | ..... | ..... | 10 | 14 | 7 | 5.1 | .0 | .0 |
| Portland, Oreg. [2] | 154 | 68 | 106 | 29.91 | 30.07 | +.01 | 56.4 | +2.2 | 72 | 17 | 63 | 44 | 29 | 49 | 22 | 51 | 49 | 83 | 2.45 | −.7 | 14 | 5.2 | se. | 18 | s. | 11 | 4 | 9 | 18 | 7.2 | .0 | .0 |
| Roseburg | 510 | 45 | 76 | 29.54 | 30.09 | +.01 | 54.7 | +.8 | 73 | 14 | 65 | 37 | 6 | 44 | 34 | 50 | 47 | 76 | 1.94 | −.7 | 12 | 3.2 | dl. | 15 | n. | 20 | 1 | 17 | 13 | 7.1 | .0 | .0 |
| ***Middle Pacific Coast Region*** | | | | | | | **59.1** | **+0.1** | | | | | | | | | | **64** | **1.77** | **+0.2** | | | | | | | | | | **4.8** | | |
| Eureka | 60 | 72 | 88 | 30.02 | 30.09 | +.03 | 54.2 | +.6 | 67 | 25 | 60 | 43 | 8 | 49 | 20 | 52 | 49 | 85 | 2.64 | +.3 | 7 | 6.6 | n. | 29 | n. | 2 | 9 | 8 | 14 | 5.6 | .0 | .0 |
| Redding [1] | 722 | 20 | 34 | 29.22 | 29.99 | ..... | 63.0 | ..... | 88 | 3 | 74 | 47 | 22 | 52 | 32 | 50 | 36 | 43 | 2.66 | +.6 | 5 | 7.7 | nw. | 25 | n. | 4 | 18 | 3 | 10 | 4.2 | .0 | .0 |
| Sacramento [2] | 66 | 92 | 115 | 29.90 | 29.97 | −.02 | 62.2 | −.7 | 90 | 3 | 74 | 44 | 8 | 50 | 38 | 51 | 42 | 55 | .86 | −.1 | 3 | 6.8 | s. | 29 | nw. | 2 | 15 | 10 | 6 | 3.7 | .0 | .0 |
| San Francisco | 155 | 112 | 132 | 29.81 | 29.98 | −.03 | 60.8 | +.3 | 87 | 3 | 67 | 50 | 7 | 54 | 27 | 54 | 49 | 72 | .93 | −.2 | 4 | 7.1 | w. | 26 | w. | 19 | 11 | 10 | 10 | 4.6 | .0 | .0 |
| ***South Pacific Coast Region*** | | | | | | | **64.2** | ..... | | | | | | | | | | **63** | **1.73** | **+1.1** | | | | | | | | | | **4.4** | | |
| Fresno [1] | 327 | 5 | 35 | 29.62 | 29.97 | +.01 | 61.0 | ..... | 89 | 1 | 75 | 40 | 6 | 47 | 39 | 52 | 43 | 58 | .76 | +.2 | 6 | 4.8 | nw. | 35 | n. | 2 | 16 | 5 | 10 | 4.1 | .0 | .0 |
| Los Angeles | 338 | 223 | 250 | 29.58 | 29.94 | −.01 | 66.0 | +.7 | 92 | 16 | 76 | 50 | 20 | 56 | 32 | 55 | 47 | 58 | 1.53 | +.8 | 6 | 7.1 | ne. | 34 | n. | 2 | 15 | 7 | 9 | 4.4 | .0 | .0 |
| San Diego [1] | 87 | 20 | 55 | 29.85 | 29.94 | −.01 | 65.6 | ..... | 89 | 15 | 74 | 50 | 30 | 57 | 33 | 58 | 54 | 73 | 2.90 | +2.4 | 8 | 6.5 | w. | 24 | s. | 3 | 16 | 6 | 9 | 4.6 | .0 | .0 |
| ***West Indies*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| San Juan, P. R. | 82 | 10 | 54 | 29.86 | 29.94 | ..... | 80.1 | +.3 | 90 | 16 | 85 | 70 | 28 | 75 | 14 | ..... | ..... | ... | 6.61 | +.8 | 18 | 8.8 | s. | 28 | ne. | 28 | 3 | 24 | 4 | 5.3 | .0 | .0 |
| ***Panama Canal*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Balboa Heights | 118 | 6 | 92 | ..... | 29.82 | ..... | 80.6 | +1.4 | 93 | 22 | 87 | 72 | 27 | 74 | 17 | ..... | ..... | [3]88 | 12.74 | +2.6 | 26 | 5.4 | nw. | 21 | nw. | 7 | 0 | 10 | 21 | 8.1 | .0 | .0 |
| Cristobal | 36 | 6 | 97 | ..... | [3]29.83 | ..... | 81.4 | +1.6 | 91 | 4 | 86 | 74 | 7 | 77 | 15 | 77 | 76 | [3]87 | 25.17 | +9.5 | 26 | 6.6 | w. | 31 | ne. | 4 | 0 | 6 | 25 | 8.8 | .0 | .0 |
| ***Alaska*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fairbanks | 452 | 11 | 87 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Juneau | 80 | 96 | 116 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ***Hawaiian Islands*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Honolulu | 38 | 86 | 100 | 29.91 | 29.95 | ..... | 77.8 | +1.0 | 86 | 30 | 82 | 69 | 24 | 74 | 11 | 71 | 68 | 73 | 3.30 | +1.8 | 18 | 10.4 | e. | 32 | ne. | 24 | 3 | 12 | 16 | 7.1 | .0 | .0 |

[1] Observations taken at airport.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly.
[4] Barometric data from airport records, other data from city office records.
[5] Wind, clear, partly cloudy, and cloudy data from city office records, other data from airport.
[6] All data except wind from airport records.

NOTE.—Except as indicated by notes 1, 2, 4, and 5, data in table are city office records.

## SEVERE LOCAL STORMS, OCTOBER 1941

[Compiled by Mary O. Souder]

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

| Place | Date | Time | Width of path, yards | Loss of life | Value of property destroyed | Character of storm | Remarks |
|---|---|---|---|---|---|---|---|
| Rock Rapids, Iowa, vicinity of. | 4 | 9 p. m. | | | $1,200 | Electrical | Barn and contents burned. |
| Blairsburg and Webster City, Iowa. | 4 | 10-10:30 p. m. | [1] 1 | | 2,000 | Wind | Barn wrecked; windmills and other buildings damaged; crops flattened path 2 miles long. |
| Joice, Silver Lake, Fertile, Hanlontown, and Meltonville, Iowa. | 4 | 10 p. m. | | 0 | 4,000 | Probable tornado | Corn flattened; trees and small buildings damaged. Barn wrecked and other buildings damaged on a farm near Joice. The storm moved toward the northeast with damage occurring in the vicinity of Myrtle, Minn. |
| Elkhart, Ill., vicinity of [2] | 4 | | | 0 | | Tornado | Barn and several buildings razed and corn flattened. In Nebo, Pike County, several families were driven from their homes because of flooding caused by the overflow of Spring Creek. |
| Mower, Fillmore, and Houston Counties, Minn. | 5 | Midnight-1:30 a. m. | [1] 2 | | 10,000 | Thundersquall | A number of trees uprooted; buildings and windmills damaged, corn and soybeans lodged. The general direction of the storm was from southwest to northeast. Property damaged over a path 100 miles long. |
| Houston County, Minn., and vicinity. | 5 | 1:30 a. m. | 22 | 0 | 3,000 | Possible tornado, heavy rain, electrical. | Number of farm buildings damaged; trees uprooted, lay on the ground in different directions; small loss in crops. Both straight and rotary winds observed. Path of storm about 8 miles long and from southwest to northeast. |
| Des Moines, Iowa | 6 | 2:35 p. m. | | | 2,500 | Wind | A sudden squall wrecked a garage, blew over oil storage tanks, uprooted trees, damaged roofs and blew down wires, with greatest damage in the eastern section of the town. Maximum wind velocity of 40 miles per hour recorded at 2:34 p. m. Path narrow and 4 miles long. |
| Kansas City, Mo. | 6 | 5 p. m. | 100 | 3 | | Tornado | Storm moved from southeastern Nebraska, southwestward across central Kansas. Houses unroofed or demolished, trees uprooted and moderate structural damage to industrial plants, and about 135 persons injured. A large part of the distance traversed was through the thinly populated Blue River Valley. Path of the storm was 9 miles long with no estimate of the total damage given. |
| Bedford, Conway, and Clearfield, Iowa, and vicinities. | 6 | 9 p. m. | 440 | 0 | 15,000 | do | This storm began one-half mile east of Bedford and traveled northeastward to Clearfield. 13 houses and a store were damaged in Conway with considerable damage along the storm's path and some livestock killed. This disturbance apparently crossed the southeastern portion of Union County and damaged buildings on 8 or 10 farms. Path 15 miles long. |
| Patterson, Iowa | 6 | 9:45 p. m. | 110 | 0 | 12,000 | do | Lumberyard and several houses in Patterson, and farm buildings in rural areas damaged over a path several miles long. Rotary winds observed. |
| Hopeville, Murray, Liberty and Osceola, Iowa, and vicinities. | 6 | 10-10:30 p. m | 220 | 0 | 500 | Tornadic winds | Loss in Murray about $500. Damage in rural areas several thousand dollars; path 20 miles long. |
| Waverly, Klinger, Grove Hills, Readlyn, and Sumner, Iowa. | 6 | 10:30-11 p. m. | | 0 | 20,000 | Tornado | A funnel-cloud observed northwest of Waverly; in other sections damage seems to have been caused by straight-line winds in narrow paths. |
| Grundy Center, Iowa, vicinity of. | 6 | 11 p. m. | | 0 | 500 | do | Several buildings damaged on 2 farms. |
| West Union and Clermont, Iowa. | 6 | 11:30 p. m. | | 0 | 3,500 | do | Barns and smaller buildings damaged. |
| Boone County, Iowa, northeastern portion. | 6 | P. m. | | | | do | Buildings damaged on 4 or more farms, a house being demolished and the occupant injured. Path 2 miles long. |
| Mapleton, Iowa, 7 miles south. | 6 | do | | 0 | 2,500 | do | Buildings damaged, livestock killed, and trees uprooted on several farms. |
| McGregor and Guttenburg, Iowa. | 6-7 | 11:30 p. m.-12:30 a. m. | 440 | 0 | 3,500 | do | Trees, electric and telephone lines down. Buildings damaged on at least 3 farms in an area several miles long. |
| Gainesville, Fla. | 20 | 1:30 p. m. | | 0 | 100 | do | Damage small and confined to tree limbs one slightly damaging a garage. Path a few rods wide and a mile long. |
| Chickalah, Dardanelle to Pottsville, Ark., and vicinities. | 26 | 4 p. m. | [1] 150-200 | 4 | 75,000 | do | The storm was first observed at Chickalah and moved northeastward through a portion of Dardanelle to Pottsville. About 20 houses demolished and many others considerably damaged. In Dardanelle 4 persons were killed and 20 injured. The small loss of life is due to the fact that the district is not thickly populated and that the tornado occurred in the afternoon. |
| Hamburg, Ark. | 26 | 11:15 p. m. | 300-440 | 15 | 125,000 | do | This storm traveled from southwest to northeast over a short path, all damage being confined to Hamburg, Ark. 74 persons were injured, 42 houses completely destroyed and 53 damaged. All electric power and light service disrupted and the municipal water plant out of use for 24 hours. Many automobiles and trees damaged or destroyed; path 880 yards long. |
| Holly, La., vicinity of. | 27 | 10-11 p. m. | | 2 | | Wind | The storm hit a community around a sawmill recently erected by the Southern Pine Lumber Company where 10 persons were injured. After striking in the Holly settlement, the freak wind jumped about 3 or 4 miles and dipped again to demolish a house on a plantation. |
| Iowa, west-central and southwestern counties. | 31 | | | | | Snow, sleet and glaze. | Many trees, telephone and power wires broken by the accumulated weight of heavy snow and sleet. Damage was heavy, but as the storm continued past midnight, a complete account will appear in November Climatological Data. |

*Late report for September 1941*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Safford, Ariz. | 28-29 | | | | $500,000 | Heavy rain and flood. | The heavy rains on the tributaries of the upper Gila River above Coolidge Dam, resulted in one of the worst floods in this area with much property damage. |

[1] Miles instead of yards.
[2] From press reports.

# SOLAR RADIATION AND SUNSPOT DATA FOR OCTOBER 1941

[Solar Radiation Investigations Section, I. F. HAND in charge]

## SOLAR RADIATION OBSERVATIONS

By HELEN CULLINANE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.), and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937, April 1941, and September 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison, Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the daily total amounts of radiation received on a horizontal surface from both sun and sky for all stations except Fairbanks, Alaska; and also the weekly means, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the Eppley pyrheliometer recording either on a microammeter or a potentiometer. If the daily figures for total solar and sky radiation at Fairbanks should be desired, they may be obtained approximately 2 months after the date of the observation by writing to the Solar Radiation Investigations Supervisory Station, Blue Hill Observatory, Milton, Mass. Table 2 also includes values of ultraviolet radiation below 3132 Angströms at San Juan (see MON. WEATH. REV., Sept. 1941, p. 286).

Radiation at normal incidence was above normal at both Madison and Lincoln.

Total solar and sky radiation received on a horizontal surface during October was below normal at all stations for which normals have been computed with the exception of Washington, New York, New Orleans, and Chicago.

Polarization measurements at Madison in October gave a mean of 73, 10 percent above normal, and a maximum of 74, 4 percent above the normal for that month.

Corrections to data already printed, due to changes in factor upon recalibration, are given for Blue Hill and Riverside.

TABLE 1.—*Solar radiation intensities during October 1941*

[Gram-calories per minute per square centimeter of normal surface]

**MADISON, WIS.**

| Date | Sun's zenith distance | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 a. m. | 78.7° | 75.7° | 70.7° | 60.0° | 0.0° | 60.0° | 70.7° | 75.7° | 78.7° | 1:30 p. m. |
| | 75th mer. time | Air mass | | | | | | | | | Local mean solar time |
| | | A. M. | | | | | P. M. | | | | |
| | e. | 5.0 | 4.0 | 3.0 | 2.0 | [1] 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | e. |
| | *mm.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *mm.* |
| Oct. 2 | 7.57 | ..... | 0.87 | 0.93 | ..... | ..... | ..... | ..... | ..... | ..... | 10.59 |
| Oct. 7 | 9.83 | ..... | 1.13 | 1.23 | 1.34 | 1.52 | 1.34 | ..... | ..... | ..... | 6.27 |
| Oct. 8 | 6.02 | 1.00 | 1.09 | 1.21 | 1.39 | 1.52 | 1.34 | ..... | ..... | ..... | 7.29 |
| Oct. 10 | 6.02 | 1.04 | 1.14 | 1.28 | 1.41 | 1.55 | 1.34 | ..... | ..... | ..... | 4.95 |
| Oct. 16 | 4.75 | .59 | .72 | 1.02 | 1.32 | ..... | 1.25 | ..... | ..... | ..... | 4.37 |
| Oct. 17 | 4.75 | .71 | .80 | 1.01 | ..... | ..... | ..... | ..... | ..... | ..... | 7.04 |
| Oct. 23 | 6.02 | ..... | ..... | 1.24 | 1.40 | 1.56 | 1.38 | ..... | ..... | ..... | 5.36 |
| Oct. 25 | 4.57 | ..... | ..... | ..... | 1.16 | ..... | ..... | ..... | ..... | ..... | 5.36 |
| Oct. 28 | 2.62 | ..... | ..... | 1.22 | 1.38 | ..... | 1.30 | ..... | ..... | ..... | 2.62 |
| Means | ..... | .84 | .96 | 1.14 | 1.34 | 1.54 | 1.32 | ..... | ..... | ..... | ..... |
| Departures | ..... | +.05 | +.04 | +.09 | +.13 | +.09 | +.11 | ..... | ..... | ..... | ..... |

**LINCOLN, NEBR.**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1 | 7.87 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.94 | 0.82 | 10.97 |
| Oct. 7 | 6.50 | ..... | 1.07 | 1.21 | 1.34 | ..... | 1.31 | 1.16 | .99 | .86 | 6.02 |
| Oct. 9 | 9.14 | ..... | ..... | ..... | ..... | ..... | 1.32 | 1.18 | 1.06 | ..... | 6.76 |
| Oct. 10 | 5.36 | 0.79 | .94 | 1.11 | 1.29 | ..... | 1.31 | 1.15 | 1.12 | .90 | 8.48 |
| Oct. 27 | 3.99 | ..... | ..... | ..... | 1.43 | ..... | 1.40 | 1.21 | 1.10 | .99 | 4.17 |
| Means | ..... | (.79) | (1.00) | (1.16) | 1.35 | ..... | 1.34 | 1.18 | 1.04 | .89 | ..... |
| Departures | ..... | −.04 | +.07 | +.07 | +.07 | ..... | +.09 | +.10 | +.10 | +.06 | ..... |

**ALBUQUERQUE, N. MEX.**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct. 1 | 7.29 | ..... | ..... | ..... | 1.33 | 1.55 | 1.35 | 1.21 | 1.06 | 0.97 | 8.18 |
| Oct. 2 | 9.83 | 0.93 | 1.02 | 1.14 | 1.26 | ..... | ..... | ..... | ..... | ..... | 10.20 |
| Oct. 4 | 6.27 | ..... | ..... | ..... | ..... | ..... | 1.32 | ..... | ..... | .92 | 5.36 |
| Oct. 5 | 6.50 | .99 | 1.11 | 1.21 | 1.37 | 1.60 | 1.39 | 1.21 | 1.10 | .99 | 5.56 |
| Oct. 6 | 6.76 | .89 | 1.01 | 1.10 | 1.29 | 1.50 | 1.36 | 1.17 | 1.01 | .89 | 5.56 |
| Oct. 7 | 4.36 | .95 | 1.06 | 1.18 | 1.34 | 1.58 | 1.35 | 1.17 | 1.07 | .98 | 5.15 |
| Oct. 8 | 5.56 | 1.06 | 1.16 | 1.27 | 1.40 | 1.60 | 1.39 | 1.21 | 1.11 | 1.01 | 6.02 |
| Oct. 9 | 4.58 | 1.01 | 1.13 | 1.23 | 1.38 | 1.59 | 1.34 | 1.19 | 1.12 | .99 | 4.75 |
| Oct. 10 | 6.76 | .88 | 1.01 | 1.12 | 1.29 | 1.47 | 1.29 | 1.18 | 1.04 | .89 | 6.50 |
| Oct. 11 | 8.49 | .84 | .96 | 1.07 | 1.22 | 1.52 | 1.27 | 1.12 | .99 | .86 | 9.14 |
| Oct. 14 | 7.57 | ..... | ..... | ..... | 1.34 | ..... | 1.34 | 1.13 | 1.03 | .92 | 7.04 |
| Oct. 15 | 6.02 | .94 | 1.05 | 1.12 | 1.34 | ..... | 1.32 | 1.15 | 1.07 | ..... | 5.79 |
| Oct. 16 | 6.02 | .90 | 1.02 | 1.15 | 1.32 | 1.58 | 1.35 | 1.20 | 1.10 | .96 | 6.50 |
| Oct. 17 | 6.02 | .94 | 1.07 | 1.18 | 1.34 | 1.61 | 1.35 | 1.22 | 1.14 | 1.01 | 6.50 |
| Oct. 19 | 6.27 | ..... | 1.05 | 1.15 | 1.29 | 1.61 | ..... | ..... | ..... | ..... | 6.76 |
| Oct. 20 | 6.02 | .97 | 1.10 | 1.18 | 1.35 | 1.61 | ..... | 1.15 | 1.01 | .91 | 5.36 |
| Oct. 22 | 6.76 | ..... | ..... | 1.21 | 1.34 | ..... | ..... | 1.21 | ..... | ..... | 7.57 |
| Oct. 23 | 7.04 | ..... | ..... | 1.21 | 1.33 | ..... | 1.34 | 1.16 | 1.05 | ..... | 7.87 |
| Oct. 26 | 5.15 | ..... | ..... | 1.21 | 1.37 | ..... | ..... | ..... | ..... | ..... | 4.75 |
| Oct. 27 | 5.79 | .94 | 1.06 | 1.18 | 1.34 | 1.57 | ..... | ..... | ..... | ..... | 5.36 |
| Oct. 31 | 4.75 | ..... | ..... | ..... | ..... | ..... | 1.38 | 1.25 | 1.14 | 1.06 | 3.96 |
| Means | ..... | .94 | 1.06 | 1.17 | 1.33 | 1.57 | 1.34 | 1.18 | 1.07 | .96 | ..... |

**LATE DATA—LINCOLN, NEBR.**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| July 10 | 13.13 | ..... | ..... | ..... | ..... | ..... | 1.11 | 0.94 | 0.84 | 0.75 | 14.61 |
| July 11 | 14.10 | ..... | ..... | ..... | ..... | ..... | 1.14 | .94 | .85 | .75 | 10.59 |
| July 28 | 16.79 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .61 | 19.89 |
| July 31 | 15.65 | ..... | ..... | ..... | ..... | ..... | ..... | .86 | .73 | .62 | 15.65 |
| Means | ..... | ..... | ..... | ..... | ..... | ..... | 1.12 | .91 | .81 | .68 | ..... |
| Departures | ..... | ..... | ..... | ..... | ..... | ..... | +.05 | +.02 | +.05 | +.01 | ..... |

[1] Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct + diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

| Date | Washington | Madison | Lincoln | New York | Fresno | Albuquerque | Fairbanks | Newport | Ithaca | Cambridge | Twin Falls | Friday Harbor | Riverside | New Orleans | La Jolla | State College | Blue Hill | Chicago | San Juan | San Juan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *ultra violet mg. cal.* |
| Oct. 1 | 343 | 400 | 451 | 209 | 451 | 528 | ..... | 262 | 262 | 242 | ..... | 287 | 484 | 242 | 472 | 248 | 280 | 379 | 370 | 166 |
| Oct. 2 | 299 | 150 | 138 | 325 | 433 | 398 | ..... | 404 | 366 | 344 | ..... | 106 | 473 | 146 | 408 | 163 | 379 | 78 | 502 | 199 |
| Oct. 3 | 212 | 117 | 233 | 34 | 461 | 142 | ..... | 46 | 87 | 43 | ..... | 125 | 479 | 439 | 459 | 118 | 54 | 140 | 373 | 292 |
| Oct. 4 | 413 | 124 | 75 | 300 | 446 | 490 | ..... | 317 | 270 | 342 | ..... | 373 | 462 | 404 | 469 | 288 | 321 | 94 | 601 | 248 |
| Oct. 5 | 423 | 357 | 105 | 361 | 466 | 512 | ..... | 300 | 267 | 226 | ..... | 337 | 342 | 487 | 297 | 267 | 267 | 441 | 544 | 262 |
| Oct. 6 | 383 | 175 | 218 | 406 | 467 | 384 | ..... | 398 | 338 | 320 | ..... | 260 | 457 | 389 | 464 | 392 | 326 | 77 | 471 | 340 |
| Oct. 7 | 384 | 418 | 438 | 72 | 458 | 500 | ..... | 142 | 262 | 81 | ..... | 178 | 452 | 500 | 379 | 358 | 91 | 430 | 519 | 354 |
| Mean | 351 | 249 | 237 | 244 | 454 | 422 | ..... | 267 | 265 | 228 | ..... | 238 | 450 | 373 | 421 | 261 | 246 | 235 | 496 | 267 |
| Departure | +21 | −30 | −95 | −36 | +31 | ..... | ..... | −10 | −4 | −42 | ..... | −16 | +71 | +12 | +10 | ..... | −57 | −29 | ..... | ..... |
| Oct. 8 | 439 | 404 | 268 | 415 | 448 | 501 | ..... | 413 | 93 | 397 | ..... | 115 | 334 | 508 | 398 | 416 | 401 | 369 | 476 | 374 |
| Oct. 9 | 427 | 48 | 421 | 365 | 440 | 489 | ..... | 427 | 300 | 354 | ..... | 55 | 446 | 475 | 461 | 331 | 395 | 44 | 471 | 337 |
| Oct. 10 | 179 | 409 | 418 | 78 | 431 | 468 | ..... | 31 | 206 | 38 | ..... | 185 | 433 | 430 | 444 | 247 | 34 | 392 | 565 | 362 |
| Oct. 11 | 420 | 330 | 399 | 440 | 368 | 457 | ..... | 401 | 294 | 256 | ..... | 105 | 441 | 519 | 427 | 226 | 336 | 400 | 399 | 231 |
| Oct. 12 | 408 | 381 | 366 | 238 | 358 | 408 | ..... | 300 | 190 | 293 | ..... | 277 | 218 | 502 | 156 | 358 | 298 | 358 | 479 | 358 |
| Oct. 13 | 410 | 39 | 120 | 349 | 435 | 381 | ..... | 384 | 396 | 367 | ..... | 108 | 433 | 510 | 433 | 352 | 385 | 174 | 270 | 125 |
| Oct. 14 | 372 | 289 | 237 | 188 | 428 | 461 | ..... | 171 | 52 | 125 | ..... | 222 | 456 | 454 | 447 | 157 | 125 | 198 | 280 | 134 |
| Mean | 379 | 271 | 319 | 296 | 415 | 452 | ..... | 304 | 219 | 261 | ..... | 152 | 394 | 485 | 395 | 298 | 282 | 276 | 433 | 278 |
| Departure | +68 | +23 | +18 | +27 | +14 | ..... | ..... | −17 | −31 | +2 | ..... | −70 | +24 | +117 | −7 | ..... | −35 | +43 | ..... | ..... |
| Oct. 15 | 170 | 324 | 298 | 85 | 377 | 360 | ..... | 218 | 345 | 301 | ..... | 101 | 444 | 420 | 445 | 102 | 296 | 226 | 397 | 225 |
| Oct. 16 | 449 | 353 | 366 | 404 | 376 | ..... | ..... | 381 | 317 | 329 | ..... | 96 | 397 | 322 | 404 | 415 | 275 | 342 | 416 | 358 |
| Oct. 17 | 347 | 153 | 128 | 317 | 396 | ..... | ..... | 396 | 384 | 361 | ..... | 264 | 320 | 167 | 317 | 256 | 389 | 129 | 368 | 321 |
| Oct. 18 | 127 | 60 | 358 | 110 | 368 | ..... | ..... | 109 | 52 | 124 | ..... | 55 | 356 | 348 | 400 | 96 | 131 | 82 | 462 | 351 |
| Oct. 19 | 282 | 147 | 188 | 269 | 118 | ..... | ..... | 331 | 229 | 334 | ..... | 234 | 97 | 471 | 243 | 160 | 410 | 192 | 401 | 342 |
| Oct. 20 | 154 | 109 | 151 | 273 | 66 | ..... | ..... | 374 | 336 | 331 | ..... | 237 | 194 | 483 | 296 | 207 | 361 | 234 | 439 | 382 |
| Oct. 21 | 305 | 241 | 194 | 175 | 82 | ..... | ..... | 274 | 144 | 222 | ..... | 212 | 192 | 457 | 104 | 135 | 239 | 263 | 440 | 372 |
| Mean | 262 | 198 | 241 | 233 | 255 | ..... | ..... | 297 | 258 | 286 | ..... | 172 | 286 | 581 | 316 | 196 | 300 | 210 | 425 | 339 |
| Departure | −23 | −25 | −51 | +6 | −104 | ..... | ..... | −4 | +3 | +23 | ..... | −11 | −52 | +219 | −58 | ..... | +7 | 0 | ..... | ..... |
| Oct. 22 | 368 | 82 | 84 | 347 | 389 | ..... | ..... | 361 | 262 | 327 | ..... | 130 | 48 | 452 | 120 | 324 | 359 | 126 | 455 | 363 |
| Oct. 23 | 185 | 337 | 265 | 95 | 332 | ..... | ..... | 147 | 40 | 100 | ..... | 239 | 98 | 423 | 40 | 125 | 100 | 365 | 374 | 232 |
| Oct. 24 | 344 | 323 | 194 | 342 | 162 | 286 | ..... | 361 | 143 | 327 | ..... | 262 | 302 | 375 | 384 | 313 | 348 | 294 | 284 | 304 |
| Oct. 25 | 334 | 299 | 127 | 304 | 319 | 329 | ..... | 344 | 80 | 197 | ..... | 24 | 373 | 403 | 388 | 285 | 274 | 246 | 410 | 237 |
| Oct. 26 | 343 | 51 | 143 | 269 | 203 | 366 | ..... | 352 | 263 | 320 | ..... | 221 | 158 | 367 | 272 | 314 | 340 | 86 | 329 | 180 |
| Oct. 27 | 76 | 221 | 372 | 127 | 282 | 391 | ..... | 219 | 44 | 179 | ..... | 106 | 197 | 188 | 280 | 73 | 184 | 26 | 193 | 66 |
| Oct. 28 | 300 | 311 | 311 | 242 | 354 | 136 | ..... | 81 | 52 | 90 | ..... | 190 | 370 | 447 | 357 | 200 | 89 | 207 | 117 | 35 |
| Mean | 279 | 232 | 214 | 246 | 291 | 302 | ..... | 266 | 126 | 220 | ..... | 168 | 221 | 379 | 263 | 234 | 242 | 193 | 360 | 236 |
| Departure | +17 | +25 | −60 | +48 | −57 | ..... | ..... | +20 | −28 | −9 | ..... | +14 | −105 | +48 | −59 | ..... | +15 | +12 | ..... | ..... |
| ACCUMULATED DEPARTURE ON OCTOBER 28, 1941 | +5,586 | +3,500 | −7,399 | +18,046 | −2,058 | ..... | ..... | −161 | ..... | −63 | ..... | ..... | −631 | +14,574 | −4,270 | ..... | −1,224 | +15,512 | ..... | ..... |

## LATE DATA AND CORRECTIONS TO TABLE 2

| Week beginning— | Blue Hill | | Riverside | | Twin Falls | | State College |
|---|---|---|---|---|---|---|---|
| | Total | Departure | Total | Departure | Total | Departure | Total |
| | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* | *cal.* |
| Jan. 1 | 121 | −21 | 185 | −59 | ..... | ..... | ..... |
| Jan. 8 | 161 | +7 | 186 | −54 | ..... | ..... | ..... |
| Jan. 15 | 119 | −44 | 253 | −41 | ..... | ..... | ..... |
| Jan. 22 | 144 | −20 | 183 | −76 | ..... | ..... | ..... |
| Jan. 29 | 187 | −28 | 307 | +76 | ..... | ..... | 101 |
| Feb. 5 | 273 | +39 | 214 | −57 | ..... | ..... | 168 |
| Feb. 12 | 198 | −35 | 216 | −78 | ..... | ..... | 174 |
| Feb. 19 | 209 | −33 | 245 | −70 | ..... | ..... | 251 |
| Feb. 26 | 225 | −76 | 231 | −125 | ..... | ..... | 237 |
| Mar. 5 | 266 | −28 | 423 | +14 | ..... | ..... | 258 |
| Mar. 12 | 353 | +40 | 305 | −93 | ..... | ..... | 324 |
| Mar. 19 | 380 | −13 | 457 | +88 | ..... | ..... | 376 |
| Mar. 26 | 438 | +51 | 390 | +20 | ..... | ..... | 351 |
| Apr. 2 | 390 | +11 | 487 | +18 | ..... | ..... | 440 |
| Apr. 9 | 476 | +118 | 291 | −156 | ..... | ..... | 516 |
| Apr. 16 | 521 | +130 | 593 | +71 | ..... | ..... | 501 |
| Apr. 23 | 375 | −59 | 455 | +13 | ..... | ..... | 562 |
| Apr. 30 | 409 | −60 | 389 | −127 | 502 | −23 | 578 |
| May 7 | 430 | −67 | 593 | +54 | 502 | −82 | 456 |
| May 14 | 651 | +120 | 566 | +58 | ..... | ..... | 519 |
| May 21 | 460 | −19 | 573 | +38 | 572 | −22 | 581 |
| May 28 | 469 | −81 | 546 | +10 | 535 | −17 | 390 |
| June 4 | 558 | −13 | 484 | −41 | 492 | −88 | 599 |
| June 11 | 367 | −120 | 580 | +6 | 570 | −45 | 324 |
| June 18 | 575 | +13 | 658 | +66 | 662 | −13 | 630 |
| June 25 | 591 | +94 | 589 | +15 | 580 | −52 | 623 |

## LATE DATA AND CORRECTIONS TO TABLE 2—Con.

| Date | Twin Falls | Ithaca | Friday Harbor | Date | Twin Falls | Ithaca | Friday Harbor |
|---|---|---|---|---|---|---|---|
| | *cal.* | *cal.* | *cal.* | | *cal.* | *cal.* | *cal.* |
| July 2 | 710 | ..... | ..... | July 23 | 417 | ..... | ..... |
| July 3 | 487 | ..... | ..... | July 24 | 278 | ..... | ..... |
| July 4 | 709 | ..... | ..... | July 25 | 631 | ..... | ..... |
| July 5 | 732 | ..... | ..... | July 26 | 317 | ..... | ..... |
| July 6 | 636 | ..... | ..... | July 27 | 484 | ..... | ..... |
| July 7 | 504 | ..... | ..... | July 28 | 631 | ..... | ..... |
| July 8 | 720 | ..... | ..... | July 29 | 698 | ..... | ..... |
| Mean | 642 | ..... | ..... | Mean | 494 | ..... | ..... |
| Departure | +41 | ..... | ..... | Departure | −74 | ..... | ..... |
| July 9 | 749 | ..... | ..... | July 30 | 621 | 249 | ..... |
| July 10 | 730 | ..... | ..... | July 31 | 534 | 222 | ..... |
| July 11 | 566 | ..... | ..... | Aug. 1 | 642 | 488 | ..... |
| July 12 | 723 | ..... | ..... | Aug. 2 | 648 | 692 | ..... |
| July 13 | 726 | ..... | ..... | Aug. 3 | 680 | 687 | ..... |
| July 14 | 666 | ..... | ..... | Aug. 4 | 665 | 541 | ..... |
| July 15 | 545 | ..... | ..... | Aug. 5 | 643 | 635 | ..... |
| Mean | 672 | ..... | ..... | Mean | 633 | 502 | ..... |
| Departure | +61 | ..... | ..... | Departure | +71 | +26 | ..... |
| July 16 | 562 | ..... | ..... | Aug. 6 | 664 | 639 | ..... |
| July 17 | 718 | ..... | ..... | Aug. 7 | 500 | 665 | ..... |
| July 18 | 427 | ..... | ..... | Aug. 8 | 312 | 658 | ..... |
| July 19 | 509 | ..... | ..... | Aug. 9 | 506 | 383 | ..... |
| July 20 | 706 | ..... | ..... | Aug. 10 | 518 | 691 | ..... |
| July 21 | 692 | ..... | ..... | Aug. 11 | 303 | 434 | ..... |
| July 22 | 681 | ..... | ..... | Aug. 12 | 305 | 354 | ..... |
| Mean | 613 | ..... | ..... | Mean | 442 | 546 | ..... |
| Departure | −3 | ..... | ..... | Departure | −106 | +104 | ..... |

## LATE DATA AND CORRECTIONS TO TABLE 2—Con.

| Date | Twin Falls | Ithaca | Friday Harbor |
|---|---|---|---|
| | *cal.* | *cal.* | *cal.* |
| Aug. 13 | 663 | 590 | ..... |
| Aug. 14 | 648 | 503 | ..... |
| Aug. 15 | 395 | 127 | ..... |
| Aug. 16 | 624 | 327 | ..... |
| Aug. 17 | 325 | 622 | ..... |
| Aug. 18 | 626 | 542 | ..... |
| Aug. 19 | 622 | 364 | ..... |
| Mean | 558 | 439 | ..... |
| Departure | +45 | −5 | ..... |
| Aug. 20 | 575 | 649 | ..... |
| Aug. 21 | 588 | 566 | ..... |
| Aug. 22 | 613 | 433 | ..... |
| Aug. 23 | 524 | 562 | ..... |
| Aug. 24 | 568 | 549 | ..... |
| Aug. 25 | 397 | 225 | ..... |
| Aug. 26 | 510 | 344 | ..... |
| Mean | 539 | 475 | ..... |
| Departure | +15 | +28 | ..... |
| Aug. 27 | 604 | 549 | ..... |
| Aug. 28 | 580 | 620 | ..... |
| Aug. 29 | 596 | 523 | ..... |
| Aug. 30 | 585 | 493 | ..... |
| Aug. 31 | 543 | 288 | ..... |
| Sept. 1 | 526 | 527 | ..... |
| Sept. 2 | 223 | 573 | ..... |
| Mean | 522 | 510 | ..... |
| Departure | +36 | −26 | ..... |
| Sept. 3 | 464 | 521 | 93 |
| Sept. 4 | 589 | 287 | ..... |
| Sept. 5 | 584 | 412 | 476 |
| Sept. 6 | 493 | 547 | 469 |
| Sept. 7 | 509 | 563 | 487 |
| Sept. 8 | 589 | 548 | 256 |
| Sept. 9 | 513 | 450 | 212 |
| Mean | 534 | 476 | 332 |
| Departure | +29 | +77 | −82 |
| Sept. 10 | 507 | 409 | 286 |
| Sept. 11 | 315 | 330 | 378 |
| Sept. 12 | 490 | 525 | ..... |
| Sept. 13 | 537 | 521 | ..... |
| Sept. 14 | 307 | 525 | ..... |
| Sept. 15 | 451 | 499 | ..... |
| Sept. 16 | 523 | 452 | ..... |
| Mean | 447 | 466 | ..... |
| Departure | −27 | +145 | ..... |
| Sept. 17 | 512 | 417 | ..... |
| Sept. 18 | 481 | 447 | 395 |
| Sept. 19 | 278 | 521 | 215 |
| Sept. 20 | 516 | 500 | 321 |
| Sept. 21 | 476 | 501 | 320 |
| Sept. 22 | 161 | 490 | ..... |
| Sept. 23 | 187 | 363 | ..... |
| Mean | 373 | 462 | 313 |
| Departure | −59 | +120 | −11 |
| Sept. 24 | 503 | 448 | ..... |
| Sept. 25 | 436 | 327 | ..... |
| Sept. 26 | 424 | 262 | 251 |
| Sept. 27 | 502 | 463 | 368 |
| Sept. 28 | 494 | 369 | 94 |
| Sept. 29 | 439 | 291 | 252 |
| Sept. 30 | 455 | 184 | 261 |
| Mean | 465 | 335 | 245 |
| Departure | +22 | +35 | −57 |

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR OCTOBER 1941

[Communicated by Capt. J. F. Hellweg, U. S. Navy (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count

| Date | Eastern standard time | Mount Wilson group No. | Heliographic: Difference in longitude | Heliographic: Longitude | Heliographic: Latitude | Heliographic: Distance from center of disk | Area of spot or group | Spot count | Plate quality | Observatory |
|---|---|---|---|---|---|---|---|---|---|---|
| *1941* | h m | | ° | ° | ° | ° | | | | |
| Oct. 1 | 11 12 | 7299 | −26 | 349 | −4 | 28 | 73 | 9 | VG | U. S. Naval. |
| | | 7299 | −21 | 354 | −7 | 26 | 48 | 10 | | |
| | | 7298 | −10 | 5 | −5 | 16 | 48 | 5 | | |
| | | 7297 | −7 | 8 | +1 | 9 | 533 | 5 | | |
| | | | | (15) | (+7) | | 702 | 29 | | |
| Oct. 2 | 11 4 | 7299 | −7 | 355 | −7 | 17 | 48 | 10 | G | Do. |
| | | 7299 | −12 | 350 | −6 | 19 | 24 | 5 | | |
| | | 7298 | +3 | 5 | −5 | 13 | 48 | 11 | | |
| | | 7297 | +7 | 9 | +1 | 9 | 509 | 5 | | |
| | | 7300 | +18 | 20 | −9 | 20 | 24 | 2 | | |
| | | | | (2) | (+7) | | 653 | 33 | | |
| Oct. 3 | 13 40 | 7299 | +6 | 353 | −7 | 16 | 36 | 7 | G | Do. |
| | | 7298 | +17 | 4 | −5 | 20 | 6 | 2 | | |
| | | 7301 | +21 | 8 | −5 | 25 | 6 | 2 | | |
| | | 7297 | +21 | 8 | +1 | 23 | 509 | 5 | | |
| | | | | (347) | (+7) | | 557 | 16 | | |
| Oct. 4 | 10 34 | 7301 | +34 | 10 | −4 | 35 | 109 | 11 | G | Do. |
| | | 7297 | +34 | 10 | +1 | 34 | 461 | 2 | | |
| | | 7300 | +44 | 20 | −9 | 45 | 12 | 4 | | |
| | | | | (336) | (+7) | | 582 | 17 | | |

See footnotes at end of table.

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR OCTOBER 1941—Continued

| Date | Eastern standard time | Mount Wilson group No. | Heliographic: Difference in longitude | Heliographic: Longitude | Heliographic: Latitude | Heliographic: Distance from center of disk | Area of spot or group | Spot count | Plate quality | Observatory |
|---|---|---|---|---|---|---|---|---|---|---|
| *1941* | h m | | ° | ° | ° | ° | | | | |
| Oct. 6 | 13 3 | 7302 | −88 | 220 | +12 | 88 | 388 | 1 | VG | U. S. Naval. |
| | | (*) | +43 | 351 | −5 | 44 | 24 | 8 | | |
| | | 7301 | +59 | 7 | −3 | 60 | 73 | 7 | | |
| | | 7297 | +62 | 10 | +1 | 63 | 461 | 5 | | |
| | | 7301 | +67 | 15 | −2 | 68 | 194 | 1 | | |
| | | | | (308) | (+6) | | 1,140 | 22 | | |
| Oct. 7 | 11 34 | 7302 | −74 | 222 | +12 | 74 | 436 | 7 | VG | Do. |
| | | (*) | −9 | 287 | +10 | 10 | 24 | 5 | | |
| | | 7303 | +9 | 305 | +15 | 13 | 121 | 15 | | |
| | | 7297 | +76 | 12 | +1 | 76 | 388 | 2 | | |
| | | 7301 | +79 | 15 | −3 | 79 | 145 | 1 | | |
| | | | | (296) | (+6) | | 1,114 | 30 | | |
| Oct. 8 | 11 55 | 7302 | −79 | 203 | +12 | 79 | 194 | 1 | VG | Do |
| | | 7302 | −65 | 217 | +13 | 65 | 48 | 16 | | |
| | | 7302 | −59 | 223 | +11 | 59 | 339 | 2 | | |
| | | 7303 | +23 | 305 | +15 | 25 | 121 | 15 | | |
| | | | | (282) | (+6) | | 702 | 34 | | |
| Oct. 9 | 11 12 | 7302 | −68 | 201 | +12 | 68 | 291 | 3 | VG | Do. |
| | | 7302 | −50 | 219 | +13 | 51 | 121 | 15 | | |
| | | 7302 | −47 | 222 | +11 | 47 | 315 | 1 | | |
| | | 7302 | −41 | 228 | +10 | 41 | 24 | 2 | | |
| | | 7303 | +36 | 305 | +15 | 36 | 121 | 3 | | |
| | | | | (269) | (+6) | | 872 | 24 | | |
| Oct. 10 | 12 41 | 7302 | −54 | 202 | +12 | 54 | 242 | 1 | F | Do. |
| | | 7302 | −37 | 219 | +13 | 38 | 97 | 11 | | |
| | | 7302 | −33 | 223 | +11 | 33 | 291 | 2 | | |
| | | 7303 | +51 | 307 | +15 | 52 | 73 | 1 | | |
| | | | | (256) | (+6) | | 703 | 15 | | |
| Oct. 11 | 11 25 | 7302 | −41 | 202 | +12 | 41 | 242 | 1 | G | Do. |
| | | 7302 | −23 | 220 | +13 | 24 | 73 | 8 | | |
| | | 7302 | −19 | 224 | +11 | 20 | 267 | 2 | | |
| | | 7304 | −15 | 228 | +10 | 15 | 121 | 13 | | |
| | | 7303 | +66 | 309 | +16 | 66 | 73 | 4 | | |
| | | | | (243) | (+6) | | 776 | 28 | | |
| Oct. 12 | 11 31 | 7305 | −80 | 150 | −14 | 80 | 48 | 1 | G | Do. |
| | | 7302 | −29 | 201 | +12 | 30 | 73 | 11 | | |
| | | 7302 | −10 | 220 | +13 | 13 | 24 | 3 | | |
| | | 7302 | −5 | 225 | +11 | 7 | 194 | 1 | | |
| | | 7304 | −1 | 229 | +10 | 4 | 121 | 12 | | |
| | | | | (230) | (+6) | | 460 | 28 | | |
| Oct. 13 | 11 17 | 7305 | −66 | 151 | −15 | 67 | 48 | 1 | G | Do. |
| | | 7302 | −15 | 202 | +12 | 16 | 242 | 3 | | |
| | | 7302 | +5 | 222 | +13 | 9 | 48 | 10 | | |
| | | 7302 | +9 | 226 | +11 | 11 | 194 | 1 | | |
| | | 7304 | +14 | 231 | +10 | 14 | 48 | 7 | | |
| | | | | (217) | (+6) | | 580 | 22 | | |
| Oct. 14 | 12 24 | 7305 | −58 | 145 | −14 | 60 | 48 | 3 | G | Do. |
| | | 7305 | −51 | 152 | −15 | 54 | 24 | 1 | | |
| | | 7302 | −1 | 202 | +13 | 8 | 242 | 8 | | |
| | | 7302 | +23 | 226 | +11 | 23 | 145 | 1 | | |
| | | 7304 | +28 | 231 | +9 | 28 | 97 | 9 | | |
| | | | | (203) | (+6) | | 556 | 22 | | |
| Oct. 15 | 11 25 | 7305 | −45 | 145 | −13 | 47 | 145 | 8 | F | Do. |
| | | 7305 | −39 | 151 | −13 | 43 | 24 | 1 | | |
| | | 7306 | −29 | 161 | −8 | 33 | 12 | 2 | | |
| | | 7302 | +11 | 201 | +12 | 12 | 194 | 6 | | |
| | | 7302 | +38 | 228 | +11 | 38 | 121 | 1 | | |
| | | 7304 | +41 | 231 | +10 | 41 | 73 | 9 | | |
| | | | | (190) | (+6) | | 569 | 27 | | |
| Oct. 16 | 11 48 | 7308 | −63 | 114 | +19 | 64 | 24 | 2 | P | Do. |
| | | 7305 | −32 | 145 | −13 | 37 | 242 | 15 | | |
| | | 7307 | −18 | 159 | −1 | 20 | 48 | 10 | | |
| | | 7302 | +26 | 203 | +12 | 27 | 194 | 4 | | |
| | | 7302 | +50 | 227 | +12 | 50 | 73 | 3 | | |
| | | 7304 | +53 | 230 | +10 | 53 | 12 | 2 | | |
| | | | | (177) | (+6) | | 593 | 36 | | |

See footnotes at end of table.

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR OCTOBER 1941—Continued

| Date | Eastern standard time | Mount Wilson group No. | Heliographic: Difference in longitude | Heliographic: Longitude | Heliographic: Latitude | Heliographic: Distance from center of disk | Area of spot or group | Spot count | Plate quality | Observatory |
|---|---|---|---|---|---|---|---|---|---|---|
| *1941* | h m | | ° | ° | ° | ° | | | | |
| Oct. 17... | 11 57 | 7308 | −50 | 114 | +20 | 51 | 24 | 2 | P | U. S. Naval. |
| | | 7309 | −37 | 127 | −12 | 40 | 48 | 3 | | |
| | | 7305 | −18 | 146 | −14 | 27 | 339 | 10 | | |
| | | 7307 | −8 | 156 | −1 | 11 | 73 | 11 | | |
| | | (*) | +6 | 170 | −1 | 9 | 24 | 2 | | |
| | | 7302 | +38 | 202 | +12 | 38 | 194 | 3 | | |
| | | 7302 | +63 | 227 | +12 | 63 | 48 | 1 | | |
| | | | | (164) | (+6) | | 750 | 32 | | |
| Oct. 18... | 11 15 | 7311 | −46 | 105 | −9 | 48 | 24 | 4 | VG | Mt. Wilson. |
| | | 7308 | −33 | 118 | +17 | 35 | 97 | 20 | | |
| | | 7309 | −24 | 127 | −12 | 30 | 12 | 3 | | |
| | | 7305 | −4 | 147 | −13 | 20 | 315 | 30 | | |
| | | 7307 | +7 | 158 | 0 | 10 | 97 | 8 | | |
| | | 7310 | +7 | 158 | +5 | 8 | 48 | 5 | | |
| | | 7302 | +51 | 202 | +12 | 51 | 242 | 4 | | |
| | | 7302 | +77 | 228 | +13 | 77 | 48 | 1 | | |
| | | | | (151) | (+6) | | 883 | 75 | | |
| Oct. 19... | 11 28 | 7308 | −20 | 117 | +17 | 23 | 145 | 11 | F | U. S. Naval. |
| | | (*) | −15 | 122 | +12 | 16 | 48 | 7 | | |
| | | 7305 | +9 | 146 | −12 | 11 | 73 | 6 | | |
| | | 7305 | +11 | 148 | −15 | 24 | 218 | 3 | | |
| | | 7307 | +20 | 157 | 0 | 21 | 73 | 7 | | |
| | | 7302 | +64 | 201 | +12 | 64 | 170 | 1 | | |
| | | | | (137) | (+6) | | 727 | 35 | | |
| Oct. 20... | 14 26 | 7308 | −7 | 116 | +17 | 15 | 267 | 16 | G | Do. |
| | | (*) | −1 | 122 | +12 | 7 | 24 | 5 | | |
| | | 7305 | +22 | 145 | −12 | 27 | 48 | 11 | | |
| | | 7305 | +26 | 149 | −15 | 31 | 194 | 3 | | |
| | | 7307 | +33 | 156 | 0 | 34 | 24 | 4 | | |
| | | 7302 | +78 | 201 | +11 | 78 | 145 | 1 | | |
| | | | | (123) | (+5) | | 702 | 40 | | |
| Oct. 21... | 11 32 | 7308 | +6 | 117 | +17 | 13 | 291 | 19 | G | Do. |
| | | (*) | +10 | 121 | +12 | 12 | 24 | 3 | | |
| | | 7305 | +35 | 146 | −12 | 38 | 24 | 8 | | |
| | | 7305 | +39 | 150 | −16 | 43 | 194 | 1 | | |
| | | | | (111) | (+5) | | 533 | 31 | | |
| Oct. 22... | 11 48 | 7314 | −86 | 12 | +1 | 86 | 145 | 1 | G | Do. |
| | | 7313 | −80 | 18 | −5 | 80 | 97 | 1 | | |
| | | 7308 | +20 | 118 | +18 | 23 | 242 | 12 | | |
| | | 7305 | +48 | 146 | −10 | 50 | 24 | 2 | | |
| | | 7305 | +51 | 149 | −16 | 54 | 121 | 1 | | |
| | | | | (98) | (+5) | | 629 | 17 | | |
| Oct. 23... | 14 49 | 7315 | −80 | 3 | +13 | 80 | 582 | 3 | G | Do. |
| | | 7315 | −72 | 11 | +11 | 72 | 776 | 4 | | |
| | | 7314 | −69 | 14 | +1 | 69 | 97 | 3 | | |
| | | 7313 | −65 | 18 | −5 | 66 | 48 | 7 | | |
| | | 7308 | +32 | 115 | +17 | 33 | 24 | 4 | | |
| | | 7308 | +38 | 121 | +18 | 40 | 194 | 3 | | |
| | | 7305 | +68 | 151 | −17 | 70 | 97 | 5 | | |
| | | (*) | +78 | 161 | −3 | 78 | 48 | 2 | | |
| | | | | (83) | (+5) | | 1,866 | 31 | | |

See footnotes at end of table.

## POSITIONS, AREAS, AND COUNTS OF SUN SPOTS FOR OCTOBER 1941—Continued

| Date | Eastern standard time | Mount Wilson group No. | Heliographic: Difference in longitude | Heliographic: Longitude | Heliographic: Latitude | Heliographic: Distance from center of disk | Area of spot or group | Spot count | Plate quality | Observatory |
|---|---|---|---|---|---|---|---|---|---|---|
| *1941* | h m | | ° | ° | ° | ° | | | | |
| Oct. 24... | 11 1 | 7315 | −69 | 3 | +13 | 69 | 533 | 6 | G | U. S. Naval. |
| | | 7315 | −61 | 11 | +11 | 61 | 630 | 3 | | |
| | | 7314 | −58 | 14 | +1 | 58 | 97 | 1 | | |
| | | 7313 | −54 | 18 | −5 | 55 | 48 | 1 | | |
| | | 7308 | +42 | 114 | +18 | 43 | 24 | 6 | | |
| | | 7308 | +49 | 121 | +18 | 50 | 194 | 5 | | |
| | | 7305 | +80 | 152 | −17 | 80 | 24 | 1 | | |
| | | | | (72) | (+5) | | 1,550 | 23 | | |
| Oct. 25... | 10 24 | 7315 | −57 | 2 | +13 | 57 | 776 | 18 | G | Do. |
| | | 7315 | −49 | 10 | +11 | 50 | 630 | 4 | | |
| | | 7314 | −46 | 13 | +1 | 47 | 73 | 3 | | |
| | | 7313 | −41 | 18 | −5 | 43 | 24 | 1 | | |
| | | 7308 | +61 | 120 | +18 | 61 | 218 | 2 | | |
| | | | | (59) | (+5) | | 1,721 | 28 | | |
| Oct. 26... | 12 13 | 7315 | −43 | 2 | +13 | 44 | 776 | 18 | F | Do. |
| | | 7315 | −40 | 5 | +8 | 40 | 48 | 2 | | |
| | | 7315 | −35 | 10 | +11 | 36 | 630 | 4 | | |
| | | 7314 | −32 | 13 | +1 | 33 | 73 | 1 | | |
| | | 7313 | −27 | 18 | −5 | 29 | 24 | 1 | | |
| | | 7308 | +77 | 122 | +18 | 77 | 218 | 2 | | |
| | | | | (45) | (+5) | | 1,769 | 28 | | |
| Oct. 28... | 12 48 | 7316 | −60 | 318 | +10 | 60 | 145 | 8 | G | Do. |
| | | 7315 | −18 | 0 | +13 | 20 | 824 | 17 | | |
| | | 7315 | −9 | 9 | +11 | 11 | 630 | 3 | | |
| | | 7314 | −5 | 13 | +1 | 6 | 73 | 1 | | |
| | | | | (18) | (+5) | | 1,672 | 29 | | |
| Oct. 29... | 10 59 | 7316 | −48 | 318 | +11 | 49 | 97 | 6 | F | Do. |
| | | 7315 | −5 | 1 | +13 | 10 | 776 | 16 | | |
| | | 7315 | +5 | 11 | +11 | 8 | 630 | 3 | | |
| | | 7314 | +9 | 15 | +1 | 10 | 48 | 1 | | |
| | | | | (6) | (+5) | | 1,551 | 26 | | |
| Oct. 30... | 12 22 | 7316 | −33 | 319 | +11 | 34 | 97 | 6 | G | Do. |
| | | 7315 | +9 | 1 | +13 | 12 | 630 | 12 | | |
| | | 7315 | +20 | 12 | +11 | 21 | 533 | 3 | | |
| | | 7314 | +22 | 14 | 0 | 23 | 48 | 2 | | |
| | | | | (352) | (+5) | | 1,308 | 23 | | |
| Oct. 31... | 10 54 | 7318 | −60 | 280 | +12 | 60 | 24 | 6 | VG | Mt. Wilson. |
| | | 7316 | −19 | 321 | +12 | 21 | 36 | 9 | | |
| | | 7317 | +7 | 347 | +4 | 8 | 12 | 3 | | |
| | | 7315 | +23 | 3 | +13 | 24 | 630 | 20 | | |
| | | 7315 | +33 | 13 | +12 | 33 | 533 | 7 | | |
| | | 7314 | +35 | 15 | 0 | 35 | 24 | 2 | | |
| | | | | (340) | (+4) | | 1,259 | 47 | | |

Mean daily area for 29 days ..... =948

*=not numbered.
VG=very good; G=good; F=fair; P=poor.

## PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR SEPTEMBER 1941

[Based on observations at Zurich. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössisches Sternwarte, Zurich, Switzerland]

| September 1941 | Relative numbers | September 1941 | Relative numbers | September 1941 | Relative numbers |
|---|---|---|---|---|---|
| 1 | 50 | 11 | *Ec* 38 | 21 | *a* 78 |
| 2 | *a* 61 | 12 | 58 | 22 | *Mc* 88 |
| 3 | 49 | 13 | *Mc* 77 | 23 | 58 |
| 4 | 53 | 14 | 83 | 24 | 47 |
| 5 | *a* 49 | 15 | *a* 91 | 25 | 63 |
| 6 | *a* 44 | 16 | *Eabc* 103 | 26 | *d* 54 |
| 7 | *Mc* 47 | 17 | *b* 148 | 27 | 43 |
| 8 | 49 | 18 | 140 | 28 | 35 |
| 9 | 34 | 19 | 132 | 29 | 35 |
| 10 | *d* 37 | 20 | 89 | 30 | 43 |

Mean, 30 days=65.9

*a*=Passage of an average-sized group through the central meridian.
*b*=Passage of a large group through the central meridian.
*c*=New formation of a group developing into a middle-sized or large center of activity. *E*, on the eastern part of the sun's disk; *W*, on the western part; *M*, in the central-circle zone.
*d*=Entrance of a large or average-sized center of activity on the east limb.

## PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR OCTOBER 1941

Based on observations at Zurich. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössisches Sternwarte, Zurich, Switzerland]

| October 1941 | Relative numbers | October 1941 | Relative numbers | October 1941 | Relative numbers |
|---|---|---|---|---|---|
| 1 | * 45 | 11 | * 27 | 21 | *a* 45 |
| 2 | *a* 30 | 12 | *Mc* 43 | 22 | 34 |
| 3 | 31 | 13 | *Eac* 43 | 23 | *d* * 53 |
| 4 | *Mc* 33 | 14 | *a* 38 | 24 | 42 |
| 5 | 28 | 15 | 48 | 25 | 44 |
| 6 | *d* * 43 | 16 | 58 | 26 | * 53 |
| 7 | *Mc* * 44 | 17 | *Ec* 66 | 27 | 63 |
| 8 | 48 | 18 | *a* * 57 | 28 | * 55 |
| 9 | 41 | 19 | * 42 | 29 | *b* 64 |
| 10 | 32 | 20 | 49 | 30 | 50 |
| | | | | 31 | *Mc* * 53 |

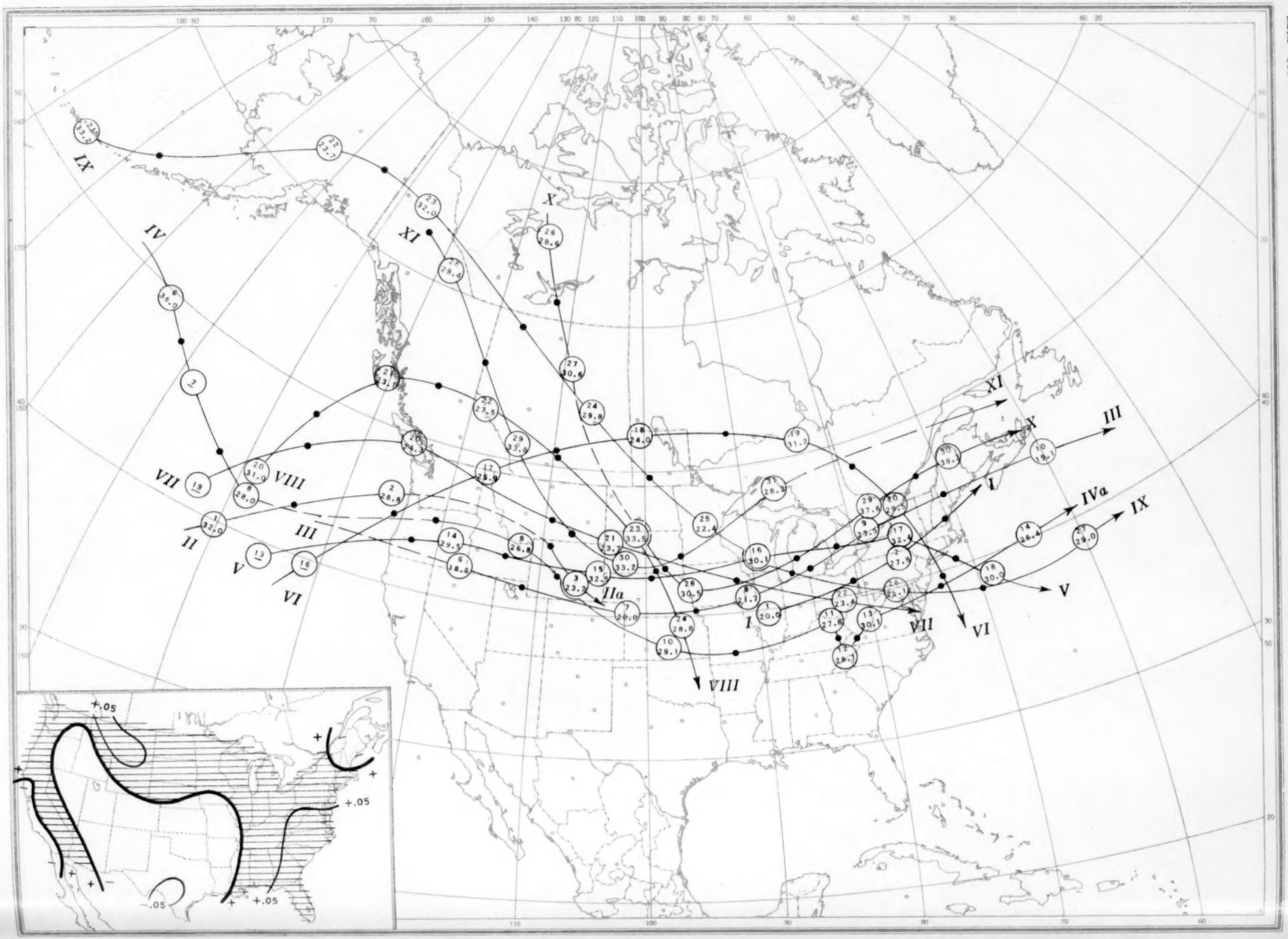
Mean, 31 days=45.2

*=Observed at Locarno
*a*=Passage of an average-sized group through the central meridian
*b*=Passage of a large group through the central meridian
*c*=New formation of a group developing into a middle-sized or large center of activity *E*, on the eastern part of the sun's disk; *W*, on the western part; *M*, in the central-circle zone
*d*=Entrance of a large or average-sized center of activity on the east limb

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, October 1941

**Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, October 1941**

**Chart II. Tracks of Centers of Anticyclones October 1941.** (Inset) **Departure of Monthly Mean Pressure from Normal**

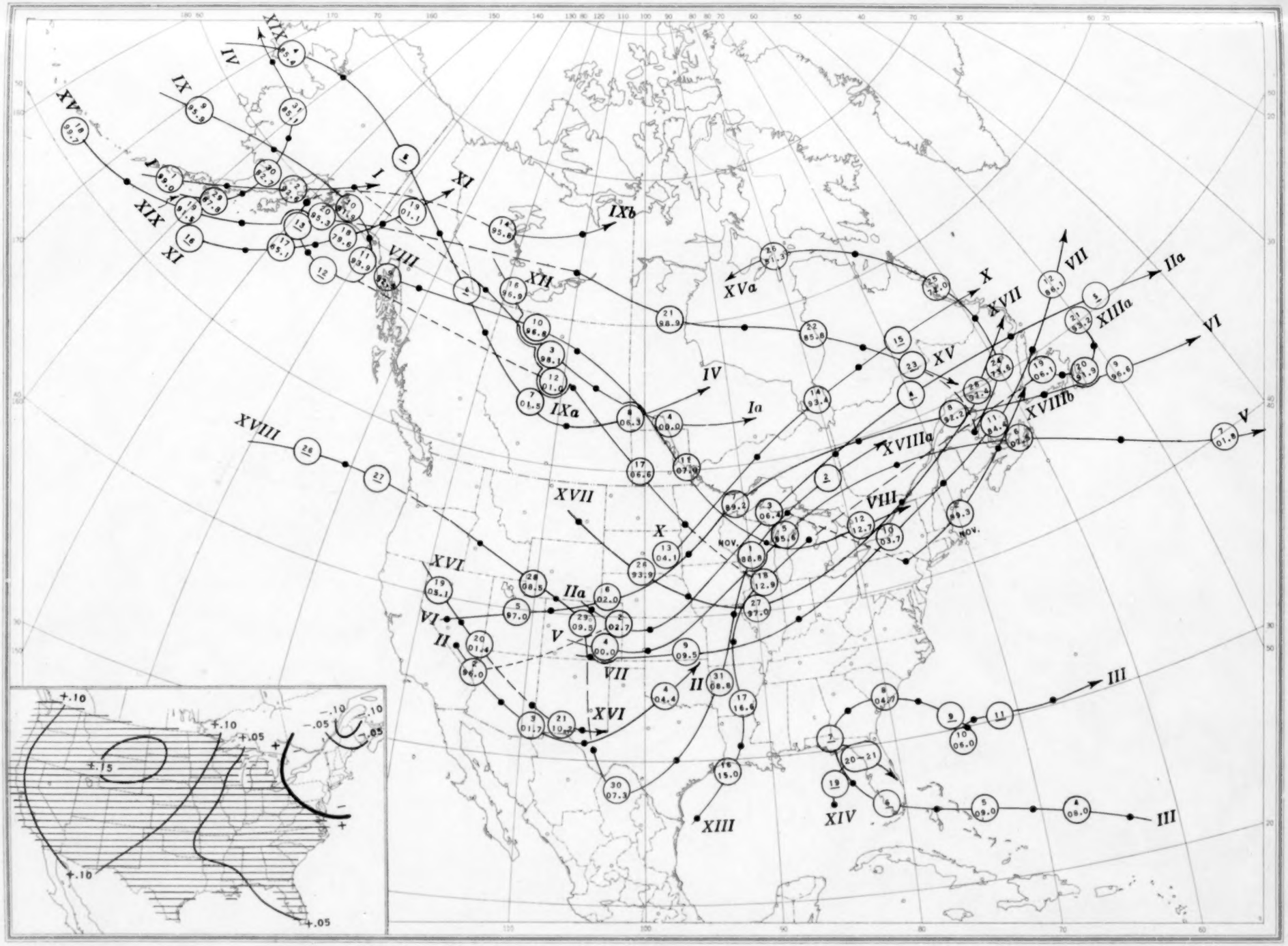



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

**Chart III. Tracks of Centers of Cyclones, October 1941.** (Inset) **Change in Mean Pressure from Preceding Month**

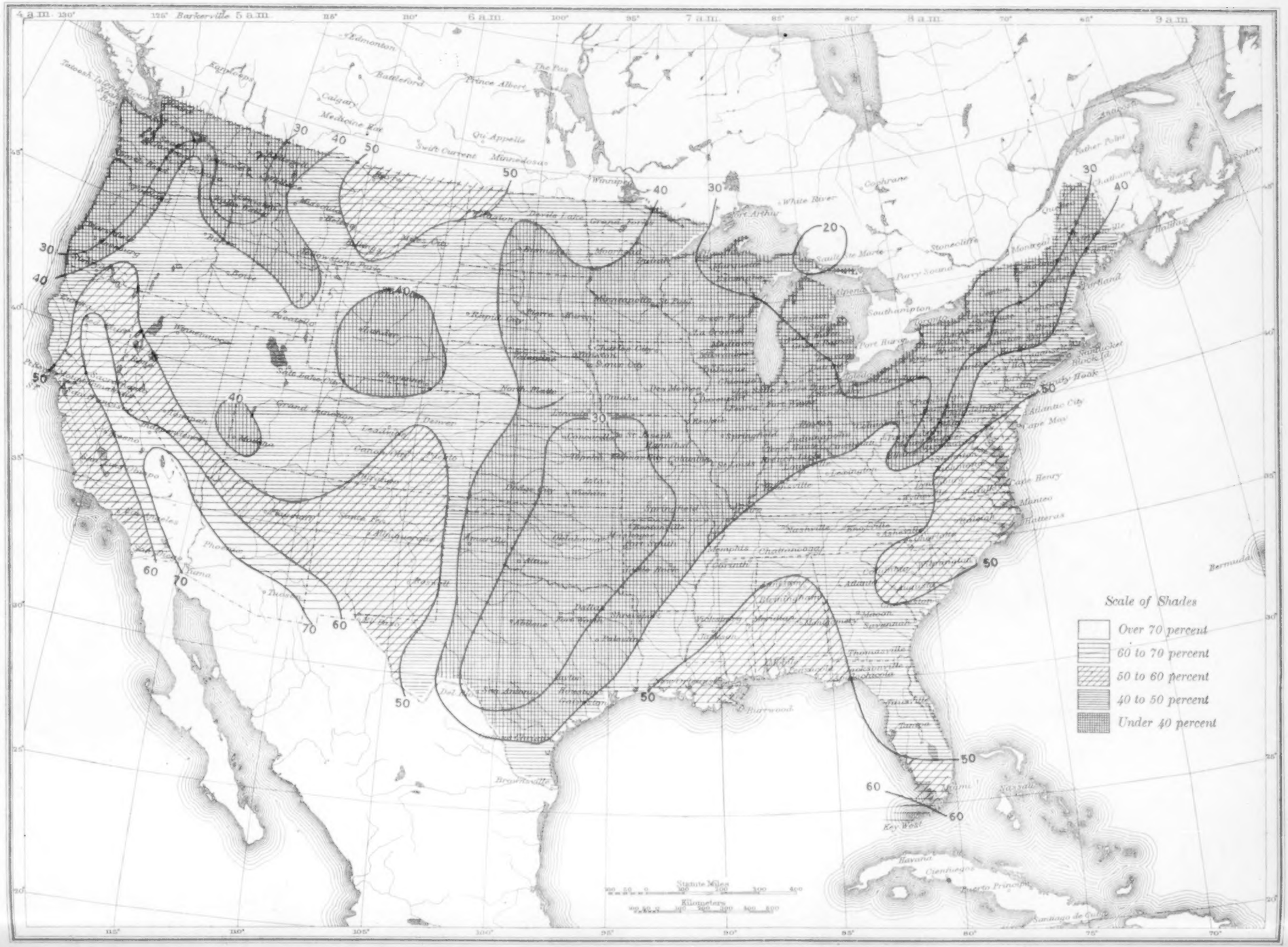
Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

## Chart III. Tracks of Centers of Cyclones, October 1941. (Inset) Change in Mean Pressure from Preceding Month




Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

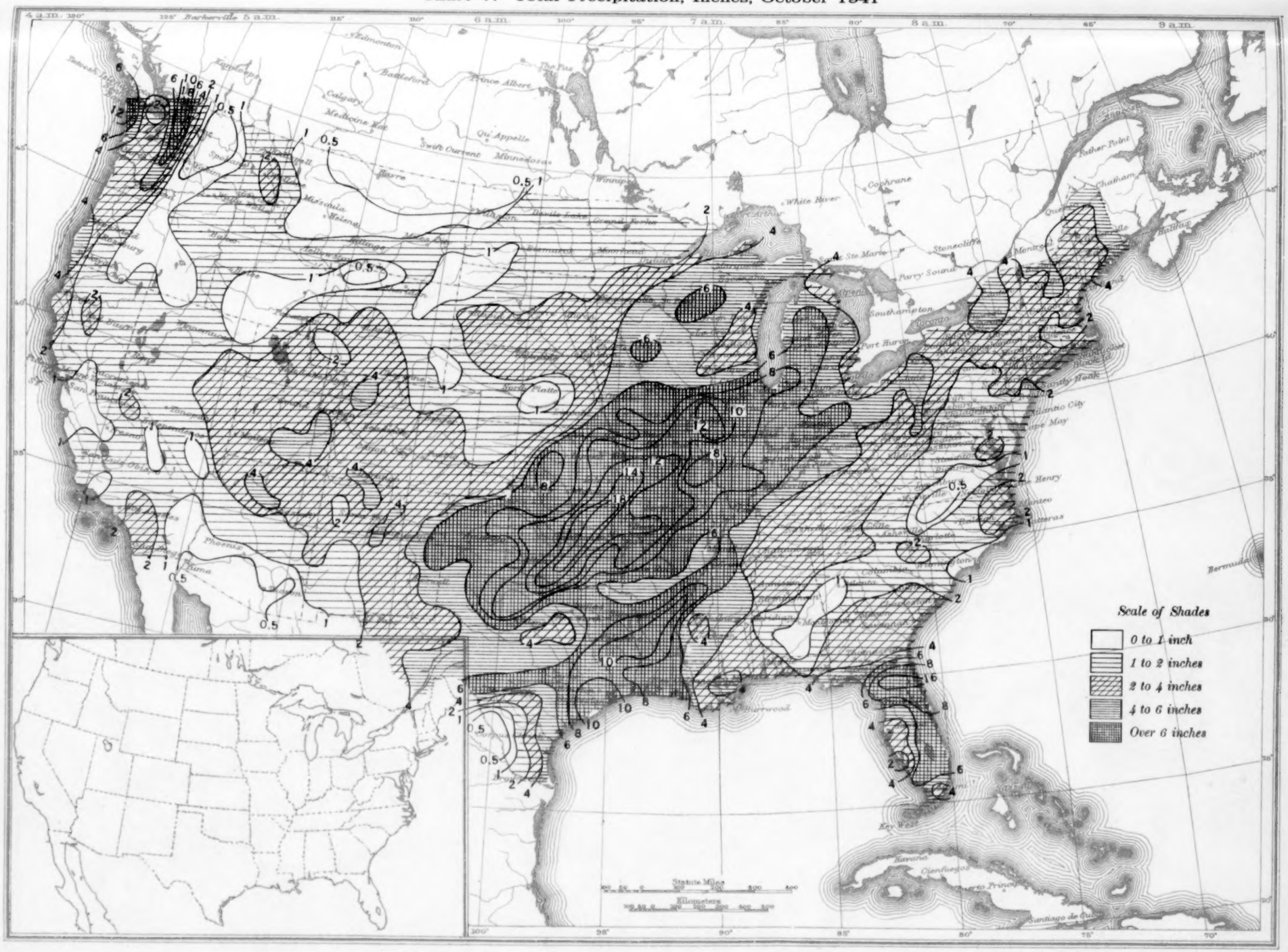
## Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, October 1941






## Chart V. Total Precipitation, Inches, October 1941

## Chart V. Total Precipitation, Inches, October 1941



## Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, October 1941

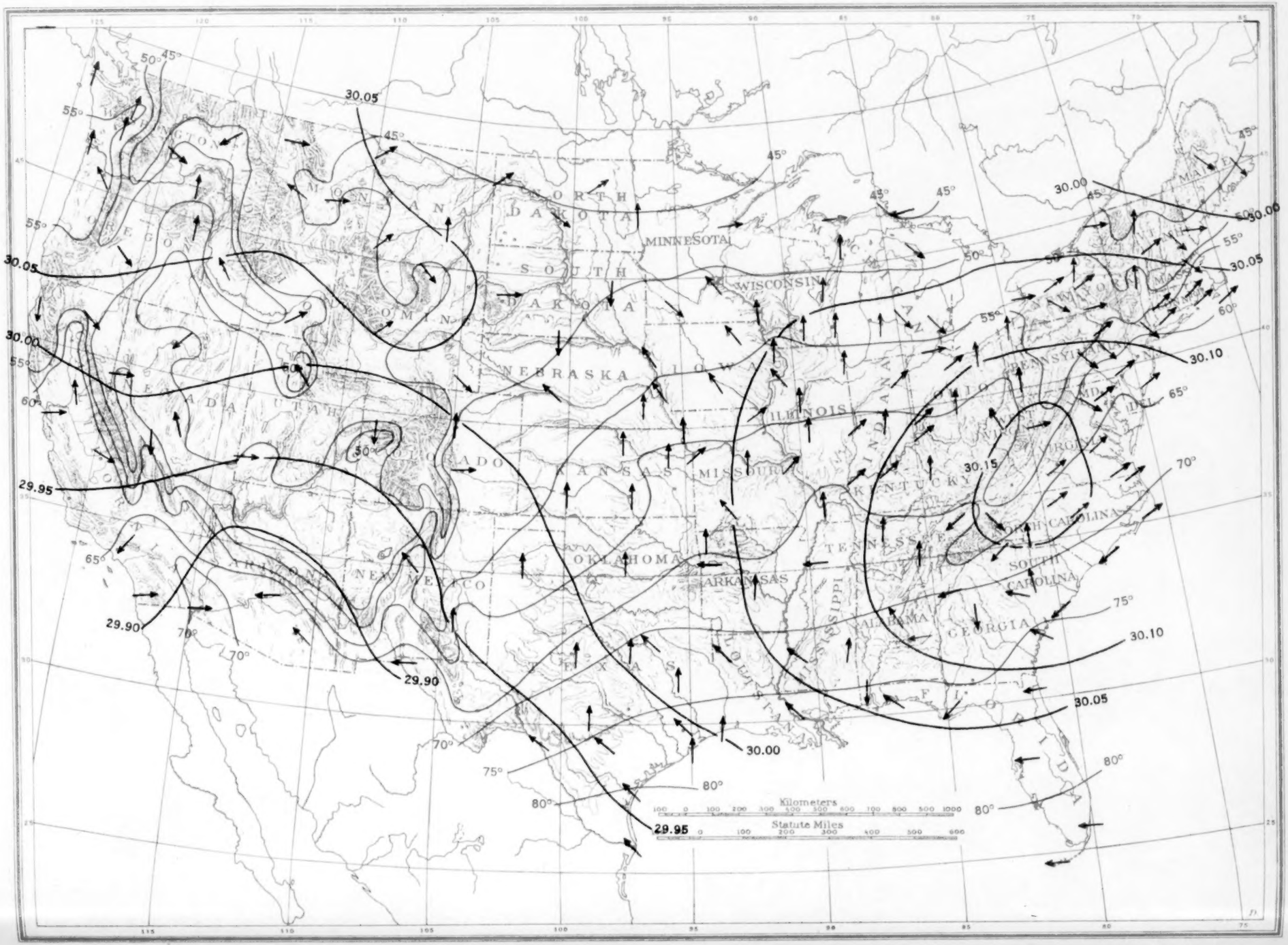





Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) October 1941

Isobars and isotherms based on radiosonde observations at 12:30 a. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) October 1941

Isobars and isotherms based on radiosonde observations at 12:30 a. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

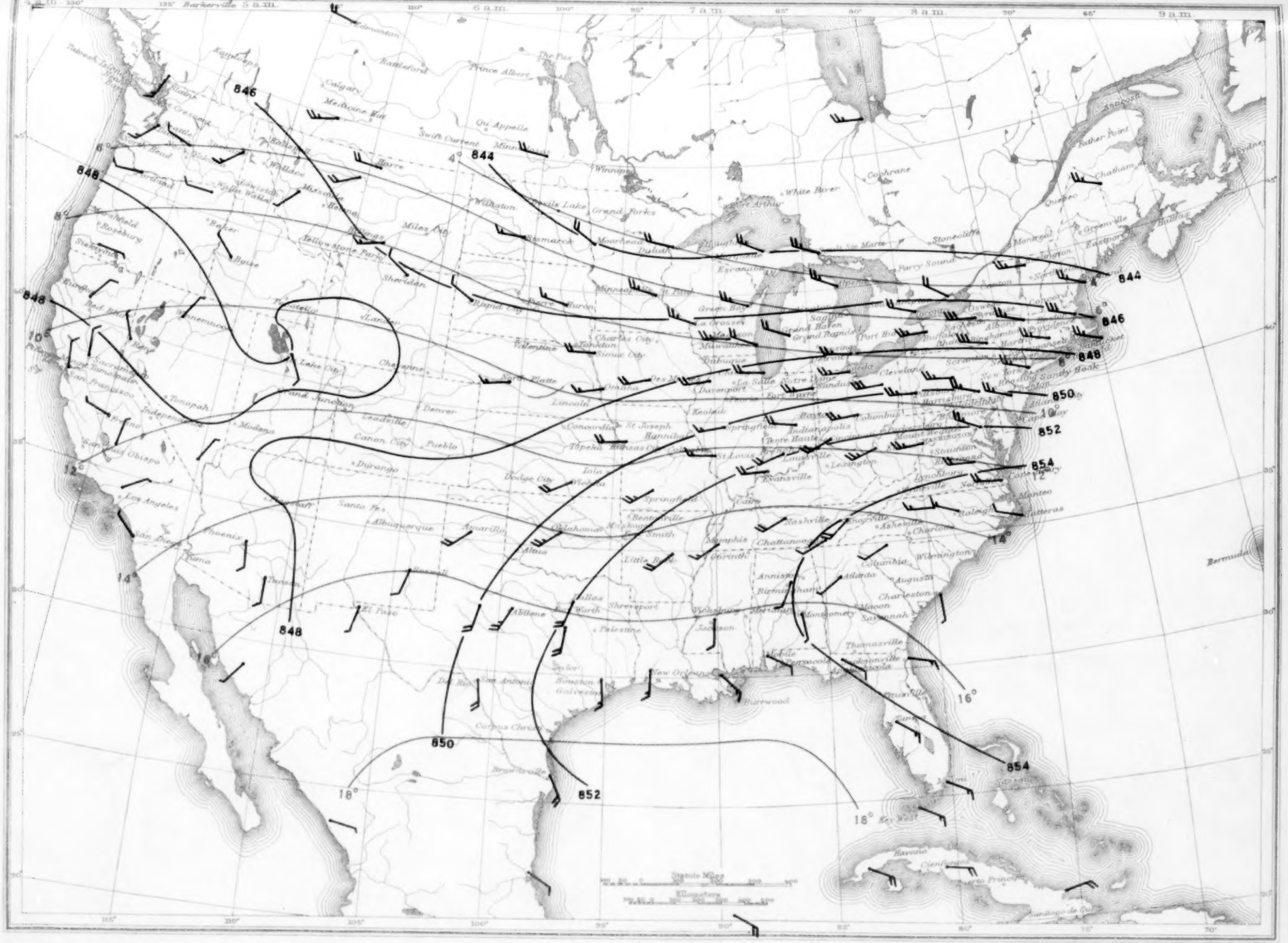


**Chart IX.** Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) October 1941

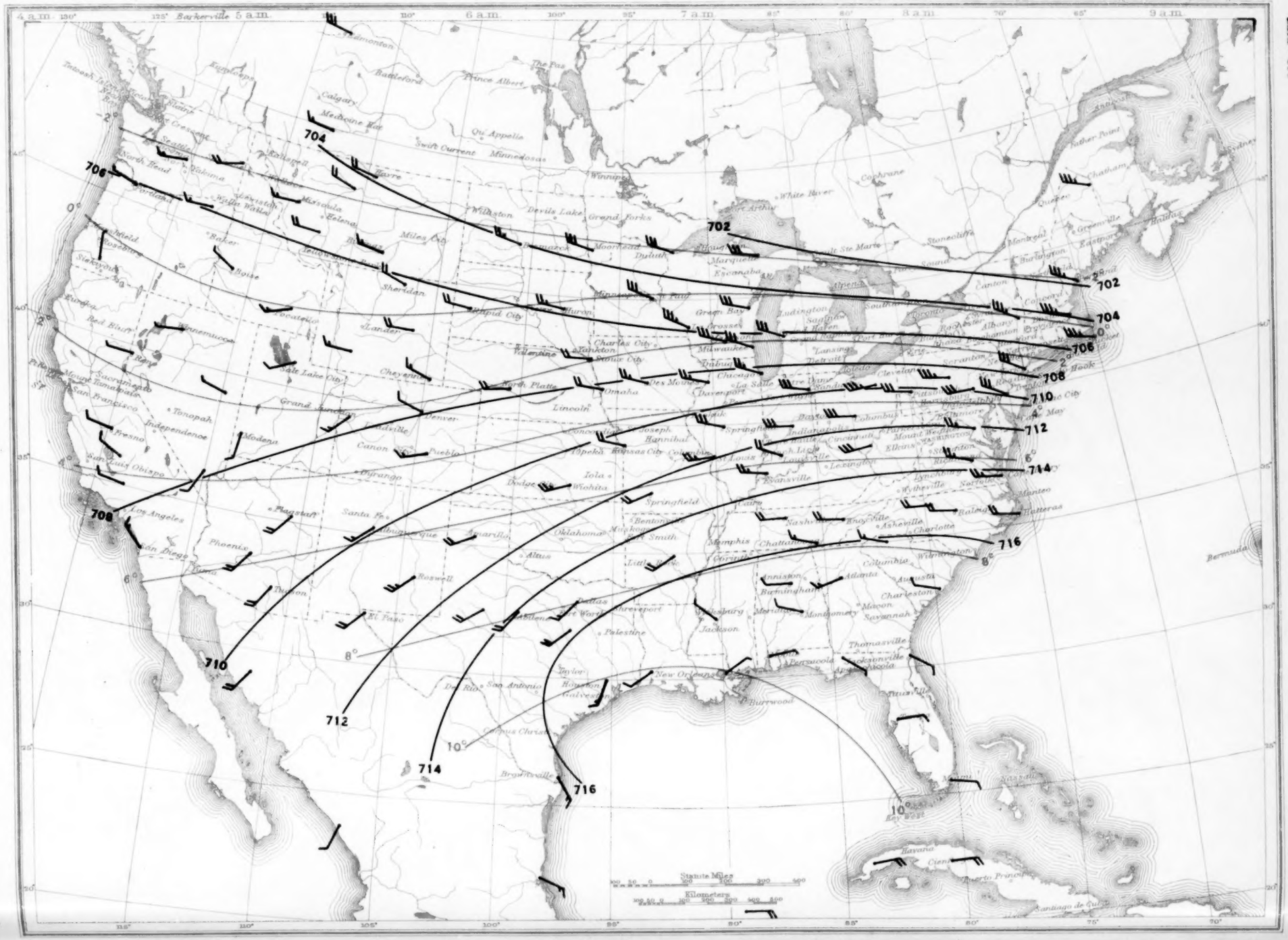





**Chart X.** Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) October 1941

Chart X. Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) October 1941

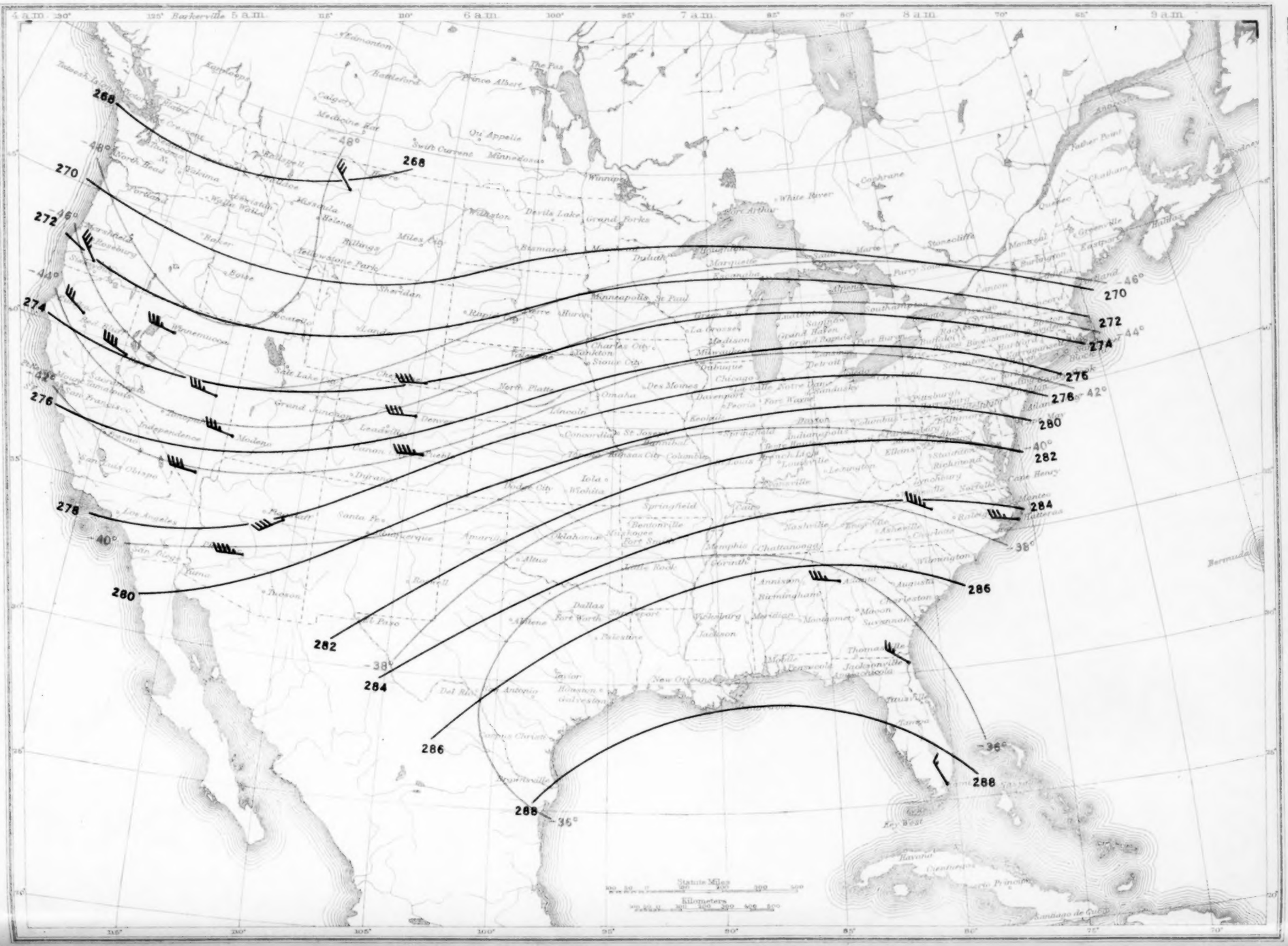



**Chart XI.** Isobars (mb) Isotherms (°C.) 1:00 a.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) October 1941